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TRANSLATION

ORDER FROM THE MINISTRY OF BREAD PRODUCTS USSR

No. 409

September 9, 1958 Moskau

The Ratification of Rules for Organization and Management of Technological Process in the Mills of the Ministry of Bread Products USSR

In order to improve the technological process in the mills of the Ministry of Bread Products USSR, and to further upgrade the quality of flour and full utilization of grain and by enlargement of experiments in earlier knowledge and achievement in science, I herewith order:

1. To abide by the rules of the organization and management of technological process in the mills of the Ministry of Bread Products of USSR which were prepared by management of flour-grit industry and combine industries for food as enterprises of the Ministry for Bread Products in USSR and by the All-Soviet research institute for grain. (VNIIZ)
2. To put into effect the ratified rules starting December 1, 1958 in all mills under the Ministry of Bread Products in USSR; at the same time, the rules passed by Main Flour Ministry on January 12, 1952, No. 50 for USSR must be disregarded.

The Minister of Bread Products of USSR
L. Korniec

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Introduction

In the history of the development of the flour industry in the USSR, the quality and quantity regulations were set up by the rules passed in 1940 which governed the technological process and management of the mills for Main flour industry.

These rules started to fight the discrepancies in the work of the industry, regulated the productiveness of milling enterprise, promoted establishment of technological discipline, to better the qualification of workers, their cultural-technical stature, became the power for leveling of the work in industry. Improvement in mechanization and technical development on a larger scale and in a shorter time in the post-war period was possible using technological advancement to establish divided work methods which were widely introduced into the industry. A technological process scheme was worked out to build a two-step method for sorting of grits and dunsts which were built on three technological lines.

The workers of different schools developed the manufacturing method for upper discharge in hammer mills. This method was adapted in many other branches of industry. Similar questions were solved by different mills.

Taking into consideration the above-mentioned changes and knowing the laws from 1952, it was necessary to review these laws and include some of the finer points, reflecting more recent knowledge and theory in the field of flour making. To fulfill these new requirements and new laws, different groups of people from ministries and from universities in this field were involved. New laws were largely discussed in different groups as in combined factories and in universities.

The following lines were considered:

-- The narrowing of VITREOUS quality borders for I and II groups of wheat. For I, VITREOUS quality which is above 60%, and for II, VITREOUS quality which is 40-60%.

-- More precision about the cold conditioning of wheat, which is more suitable for the above-mentioned groups and for the first time is given recommendations for hot conditioning.

-- The ~~amounts which it is possible to produce~~ norms for grain cleaning and for are rechecked.

-- Technical characteristics have been worked out for many graded grinding of different mixtures of better quality hard and soft wheat for flour which is used in macaroni.

-- Again revised the principles of sortation and methods of work in different parts of the process with our scientific approach and new technological methods.

-- Taken in consideration the scientific results in the fields of grinding, sifting and upgrading.

-- Changes have been made in the different calculations of production.

-- Recommended new control of technological process which is performed by the mill staff.

The rules also reflected change of structure of management of the mill. At the end of the book are given examples for grinding of rye and wheat. These schemes should be considered as basis for technological process but local conditions should be taken into consideration.

New rules do not give any recommendations for mills which are working on pneumatic systems. It will be necessary to have time to form new rules in this field based on experience. The rules for production norms in this field should be rechecked to make them clear and to use them properly, to use specific findings to improve the mill products and, at the same time, to be on the lookout for innovators and apprentices, thereby departing from old Russian milling methods.

The new technology required looking over the methods of organization and the structure of the technological process in detail to solve new questions about grain -- how to obtain the correct compounding of milling mixtures, more careful preparation of grain for milling, using different levels of moisture and removal of moisture, using new methods of formation to make better quality of grits, and

milling itself. That organization had temporary laws on how to fulfill technological process and so the change to new laws in 1952.

New rules improved production and also efficiency of mill products and milling staff, and provided new methods of scientific research for the flour industry.

The rules of this organization and the fulfillment of this technological process should serve as a foundation for improvement of the quality of flour and also to increase utilization of grain and future magnitude in this field. To realize these aims, all efforts of milling industry employees should be used and guided.

I General Instructions

1. Rules of organization and management of technological process in the mills of the Ministry of Bread Products USSR must help to utilize man power, equipment and energy, with the end result of better utilization of grain to attain the norm or higher flour and farina quality.
2. Under present rules, engineers and technical personnel, workers and clerks in the mills must insure the attainment of norms or better in production, as in quality, to produce the planned 24-hour requirements and utilization of energy, continuously trying to improve present requirements to achieve the best in technological process.
3. Rules pertained only to mills which work on rye and wheat, and mills producing the rest of crops must follow special orders of the Ministry, and ministries of the different republics.
4. In these rules, the following basic principles must be observed:
   a. To place the received grain in the proper place according to quality.
   b. Rational and even use of different quality grain according to the formula.
   c. To set up the technological process according to the formula, which considers rational use of grain and using in different order to obtain different grades of flour by preset assortment.
   d. The proper use of machines according to the work plan and by process steps, keeping in mind the specific technological grain qualities in the process.
   e. The full and systematic preparation of the process and rhythmic use of mill, according to individual lines and maintaining hourly production timing.

f. High quality packing and marking exactly according to the grades of product.

g. Rigid sanitary ~~rules~~ regime must be observed in accordance with existing rules.

h. Timely and exact account of grain received to be used in production, account of production and also of the tail end.

i. Technological control of the technological process and the results of production and quality.

j. Check of present equipment and its repairs.

k. Presence, according to the hours, of spare parts and other supplies.

5. These rules to be known to administrative and engineering staff, employees indirectly taking part in this process, employees of the storage industry, personnel of inspection department and also for employees of counties and republic organizations which are involved in the flour industry.

6. For execution of these rules in the mills, these people are responsible:

a. ~~Head of the technological department~~ director and head engineer, production and quality control persons, in each department.

b. ~~Director and head engineer~~ Head miller, production and quality control personnel and in general in the whole factory.

c. Assistant (shift) engineers and assistants to the head of the technological department to supervise in each shift.

d. Workers of that department each responsible in its section.

e. Director of transportation, elevator and storage department, chief of the elevator, chief of the storage room and their shift co-workers, persons who do premixing work, the scale man and also the rest of the staff.

f. Director of the technological department, chief of chemical laboratories, senior laboratory personnel and laboratory personnel, persons who control the movement and storage of grain, prepare the mixtures according to formula, prepare for actual grinding, the clerk who prepares the accounts for norms and produce, and who sorts and directs the product for storage.

II. Standards and Quality of Production in Mills Producing Wheat and Rye Products

7. The mills of the Ministry for Bread Products produce only according to approved standards.

8. From wheat are produced the following products:

a. Bread baking flours -- (1) farina, (2) highest grade, (3) first grade, (4) second grade, and (5) bran.

b. Macaroni flour -- (1) highest quality (grits), (2) first grade (half grits), (3) second grade (flour is used for bread baking).

c. Farina

9. From rye is produced sifted and pearled flour, flour with bran, flour with bran rye-wheat, and flour with bran wheat-rye.

10. Produced during the process of wheat and rye in mills are: feed flour - wheat and rye, bran of wheat, bran of rye, test runs which are used for feed, and unusable portion.

11. All qualities of above mentioned groups are set by GOST and are appended in addition No. 1.

12. The qualities of feed products and unusable portion are determined by Ministry of USSR.

13. To use new varieties of different qualities according to orders of Ministry, temporary norms are set for execution.

III. Yields and Norms of Production

14. The production in the mills must be conducted according to the planning and standards. The attainment of norms for flour is a must. Over-attainment of norms for higher grade flour is permissible by outstripping average ashes from all flours.

15. For working with wheat flour, the standards and produce in production are shown in Table 1.

16. For working with rye flour, the standards and produce in production are shown in Table 2.

17. The norms for production basis for wheat and rye flours are based on the following quality: Moisture - 14.5%, ash in clean grain (without weed seeds) 1.97%, containing weed seeds - 1% (including mineral dist 0.2%), perusiaus 0.1% (bitter-wort or lint ~~0.05%~~ 0,05%), other grain 1%; the specific weight of best kind of wheat by milling - 750 g/l. Increase or reduction in production depends on lead off of basic quality illustrated in Table 3.

18. The obligated norms are called manufactured flour; norms for bran, cleanings, drying and loss in machinery are for orientation.

IV. Basis for the Organization and Management of Technological Process

19. The technological process in every mill must be organized and put in effect:

a. Suitable ordinance for the particular work in the mill.

b. Confirmed scheme for preparing the grain before grinding and actual milling.

c. By maintaining proper work in every system, set up by every mill corresponding with the rules and quality of grain to be milled.

20. The milling, how every mill should operate, is set up by Ministry, head management and management of bread products for united republics.

21. The scheme for technological process must indicate:

a. Quality and capacity of grain stored in elevators or warehouses for the mill.

b. Quantity suitable for flour and distribution of it for every system.

c. Consequence for fulfilling the suitable technological process or otherwise directing the intermediate products to other system.

d. The quantity and distribution of magnet protection, set up before grain cleaning machinery and in grinding department and for control of ready product.

e. To arrange flour streams received from different system for control or for formulating of different grades in production.

f. The quantity for aspirator and the passage over screens suitable for all aspirator lines.

22. Through the schemes, instructs the measurements and technical characteristics of working machinery and with illustrations shows the roll grinding line and division for different systems.

23. The scheme must be drawn up in graphical way, showing the places for machinery and location, and more consequently describing the role in the technological process.

24. By working out the scheme, the following things must be used as a guide:

a. The technical norms; in order to achieve the technological expectations and the use of energy or actual coming up to expected results or to surpass them.

b. The technical norms of composed scheme and regime of work in each system and characteristic work of machines in details, as prescribed by rules.

c. By rules prescribed installation of magnets in mills and grits enterprises (Appendix 2).

25. The scheme for technological process should be worked out by miller and head engineer with participation of director of technological control.

26. The worked out scheme for the enterprise is submitted to the industrial technical adviser. Then the worked out scheme with changes is returned back for approval.

27. In case the mill is set up for new grinding and new equipment installed with changes in previously established technological process, the scheme must be worked over.

28. Scheme before being introduced and put in effect must be approved:

a. For assorted rye and wheat milling -- by head management, by main management and divisions of flour and grit and combined milling office of each republic's organization for bread products.

b. For both milling procedures of grinding for 85% wheat and 87% rye by state management of bread products.

29. It is against the rules to make changes in the scheme of technological purposes, without authorization.

30. It is against the rules to exclude from work some parts of approved scheme.

31. The suitability, in order to utilise the grain in better way for fulfillment and over-fulfillment of norms, the quality of product and to improve 24-hour run as planned, could be led by head engineer making some changed in approved scheme, without disturbing the basic scheme.

32. Every change, stated in approved scheme, obligatorily must be recorded in diary, about the change of technological process, and which is kept by head miller.

33. The approved scheme and changes must be known by the engineer of technical personnel of technological process, the workers, management of technological process in the mill, and employees of technical-chemical control. The scheme with changes is displayed in the mill and laboratory

34. In order to substantiate the correct procedure of technological process and continuous work of the mill, the mill is planning current formula for grain used.

35. The formula for grain to be ground is worked out for every ten-day mill run, showing the quality of grain in the mill.

36. The formula for grinding is worked out by the head miller and by the director of technological control at the mill, with the participation of chief of the elevator or grain warehouse and later approved by the chief engineer of the mill.

37. By working out the formula, it is necessary

a. To utilise the grain in the mill of the same type and semi-type with corresponding quality (moisture, weed seeds and grain impurities, ash, quantity and quality of gluten).

b. To mix the new grain with the old from the previous year for two months if they are in mill warehouses.

c. To determine and divide the grain in certain groups for milling according to the analyses made in the laboratory, or where there are experimental mills, them according to the experimental mill runs.

38. To execute the formula correctly, it must be followed by the management and workers of grain storage and mill workers by preparing the grain for grinding.

39. Knowing the composition of the formula, the chief of the department of technochemical control of the mill first of all calculates the amounts to be produced and submits to the head miller, who in turn informs the shift foreman and the workers of technological process in that division.

40. The arrangement for grain to be ground in each mill is set up by the head miller according to quality.

41. By setting up the regime for work, the head miller is bound to orientate according to the rules and circumstances set up for proper process.

42. The orders given by the head miller for regime of technological process must be maintained by the shifts engineer, assistant miller and the workers of cleaning house and in ground products division.

43. The utilisation of grain must be illustrated as quality of production, the regimes for technological process, and proofs from laboratory for miller's support, his assistants and workers of grain cleaning and ground products division.

V. The Receiving, Distribution, Storage and Preparation of Grain for Grain Storage

A. Receiving of Grain

44. The quality of received grain must correspond with conditions set up in appended Table 3. By receiving the grain with off-quality, with the permission of Ministry of Bread Products USSR, it must be immediately worked over to meet the specifications.

45. The quality of grain delivered to the mill must be observed by deliverers.

D. Distribution and Storage of Grain

46. The distribution and storage of grain in elevators and warehouses by the mills must correspond as follows:

a. to keep the quantity and improve the quality of received grain before directing them to the mill.

b. Separate keeping of grain according to their technological nature and established quality in order to compound the correct formula for grinding in the mill.

47. The direction of grain to the mill must be done according to the established procedure.

48. The procedure for moving the grain is worked out by the techno-chemical control of the mill, with the participation of the chief of the elevator and the head miller, by supervision of the head engineer, and approved by the director.

49. In the mills conducting grinding of sorted or graded flours, the plan for distribution must include separate storage:

a. the grain grown in different districts - by the types as established by government specifications for wheat and rye. The soft wheat types, I, II, III, IV and V, must be divided into three groups for storage according to the glass control:

-- vitreousness above 60%

-- vitreousness from 40 to 60%

-- vitreousness less than 40%

By receiving wheat of lower than 20% vitreousness, it is recommended that it be stored separately. The wheat is placed in groups according to the deliverer's documents, but if there are no documents, then according to the analysis. The hard wheat (II type) must be stored separately from soft wheat.

b. The grain according to the moisture: to 14%, from 14% to 15.5%, from 15.5 to 17.0%, and higher than 17%.

Remark: In the districts where grain delivered to the mill is moist and raw (moisture higher than 17%), it is recommended that it be stored separately, with moisture difference of 2%.

c. The grain with different volume weights (nature): higher than 750 g/l (wheat) and higher than 700 g/l (rye), from 750 to 690 g/l (wheat), from 700 to 650 g/l (rye), lower than 690 g/l (wheat), lower than 650 g/l (rye).

d. The grain with different gluten consistency: to 20%, from 20 to 25% and higher than 25%.

50. In the mills, producing the flour in both grades, the procedure must be worked out for separate grain storage according to:

a. different moisture (para 49);

b. wheat, with consistency of gluten to 20% and higher than 20%.

51. The grain with lower quality, as it is set up by Ministry of Bread Products, must be stored separately.

52. The below-standard grain received in the mill from the deliverers must be stored separately and ground separately.

D. The Grain Preparation Before Transfer to Grain Cleaning Department

53. The grain to be transferred to the grain cleaning department of the mill from warehouses and elevators must correspond to the following standards of quality:

a. Moisture - for graded grinding depending upon viscousness - to 15.5% in those cases where washing is used and to 14.5% when the grain is not washed; for both grindings the results must be the same in order to obtain flour with standard moisture.

b. The weed seed admixture - not more than 2%, in that amount pernicious to 0.2%. In the amount of pernicious admixture separately compounded, ergot and spores should not exceed 0.05%. The grain containing ergot, dirt and chemical impurities must be sent to the mill in the sacks and pass through the washing machines.

c. Other grain - not more than 5% in wheat and 4% in rye (including sprouted grain not more than 3%).

d. The quantity and quality of gluten in the wheat must meet the specifications in order to produce standard flours.

e. The grain must be of good quality, i.e. with no foreign materials, no off-odors, no sprouted grain or other contaminations.

54. The grain, before grinding in the mill, must be cleaned in separators. The aspiration in these separators must work with utmost effectiveness.

55. In order to utilize properly the technological process for grinding the dried grain after drying must be kept for five 24-hour periods in order to obtain equalized moisture content.

56. For drying of the grain, special instructions must be followed (Instruction for wheat drying regimes, published 1952). The drying must accomplish lowering of moisture without lowering the quality of gluten, scorching the grain or adopting the smell of smoke.

57. The grain is transferred from storage in groups, by the prescribed formula.

58. When mill grain storage is sufficient, then special storage capacity should be set up for 50 - 24-hour runs.

59. In mills which are not equipped to prepare the mixture for grinding, it must be done in the grain cleaning department.

60. The hard wheat is added to the soft wheat in the cleaning department after the hard wheat has been conditioned separately.

61. The delivery of grain to the mill for grinding is worked out by the techno-chemical department with participation of the head miller, the chief of elevator, and approved by head engineer of the mill.

VI. Preparation in Grain Cleaning Department of Grain for Grinding

A. Designation and Range of the Process

62. The preparation of grain for grinding in grain cleaning department must correspond with the following regulations:

a. The removing of impurities, husking and washing in machines to the required standards of quality for grinding, and transfer for processing (on first cleaning system).

b. The conditioning for graded grinding of wheat and rye for better utilization of technological process.

c. Compounding the groups of grain of different technological characteristics and bread baking qualities corresponding to the established procedures.

63. The grain, transferred for grinding (first cleaning system) must correspond with the following standards of quality:

a. Moisture (depending on technological properties of grain):

In graded grinding of wheat, from 14 to 16.5%.

In graded grinding of rye, from 13.5 to 15%.

In grinding of both wheat and rye, moisture must be equalized in order to obtain standard flour.

b. For weed seed impurities, there must not be more than 0.4% -- in that amount 0.1% mustard, etc.; pernicious premix (ergot, water pepper, etc.) not more than 0.05% -- in that amount not more than 0.04% water pepper. There must not be premix of heliotrope, trixodesma incanum and minerals.

Table 5

Technical Norms for Grain Cleaning Department

Name of Machine	Technical Characteristics of Machine and the Norms
Separator	1.4 t/24 hrs. on 1 cm, width of screen.
Aspirators	1.3 t/24 hours on 1 cm, length of feed in valve.
Cockle separator	Slow turning cylinder; diameter of cylinder 600 mm, length 2240 mm, productivity 21 t/24 hrs. Fast rotating cylinder; Diameter 600 mm, length 2000 mm, productivity without moving part 72 t/24 hrs.,with moving part 96 t/24 hrs. Disc: Disc diameter 630 mm, number of discs, 27; productivity 90 t/24 hrs., with work of control discs 80 t/24 hrs.
Oat separator	Slow rotating cylinder type: diameter 600 mm, length 2240 mm, productivity 17 t/24 hrs. Fast rotating cylinder: diameter 600 mm, length 2000 mm, without moving part 50 t/24 hrs., with moving part 67 t/24 hrs. Disc: diameter of discs 630 mm, number of discs 27, productivity 85 t/24 hrs.
Husking machine with abrasive cylinder	On 1 m^2 of working surface of cylinder 28 t/24 hrs. for wheat and 24 t/24 hrs. rye.
Husking machine with steel cylinder	Cylinder diameter 475 mm, length 1295 mm, productivity 140 t/24 hrs; cylinder diameter 584 mm, length 1260 mm, productivity 280 t/24 hrs.
Brush machine	On 1 cm^2 of working surface 18 t/24 hrs.
Washing Machine	Horizontal: Drum diameter 1050 mm, length 2000 mm, productivity 150 t/24 hrs. The multiple purpose vertical with tempering column diameter 900 mm, height 1960 mm, produdtivity 150 t/24 hrs.
Stone separator - Grigorjew	200 5/24 hrs.
Apparatus for moistening with water	In capillary form - productivity to 250 t/24 hrs, with spraying 150 t/24 hrs.
Conditioner	Type KK-4 productivity 100 t/24 hrs. Type KK-60 productivity 150 t/24 hrs.

Remark: 1) For newer type of machines and construction, the instructions accompanying the machine must be followed.
2) For magnetical barriers, instructions are prescribed in Appendix No. 2.

c. There must not be more than 4% of rye and barley in wheat and not more than 4% of barley in rye.

64. For setting up the scheme for grain to be prepared for grinding, the steps shown in Tables 4 and 5 for machines and standards of operation must be followed.

65. In the mills conducting the grinding of flour of many grades, the groups of grain must be prepared separately according to the technological consistency. It is recommended that the conditioning of hard and soft wheats be conducted separately, according to Tables No. 6 and 7, and only after conditioning can they be mixed and kept in bins.

66. The tailings obtained in grain cleaning must be divided into the following groups:

a. Unusable - to be discarded.

b. Containing other grain - obtained using trieur.

c. The tailings which in mixture could be used for feed. The tailings must not contain more than 2-3% of normal grain which has been cleaned; normal grain is considered full grain of wheat passing through sieve opening 1.7 x 20 mm and full grain of rye passing through sieve opening 1.4 x 20 mm. Dust may not be added to the bran. The tailings for feed and "unusable" (excepting the ones from aspiration separators), dust from filters, cyclones and sieves are checked separately in order to establish the loss of normal grains.

B. Preparation of Grain for Grinding

Cleaning and Husking

67. Cleaning in separators must accomplish maximum separation of weed seeds. The cleaning is effective if, by passing through the machine, the following is removed from the grain:

a. 65% premix reduced to less than 1%.

b. 70% premix reduced to 1-2%.

68. For proper cleaning of grain, it is necessary to select the proper screens and regulate the aspiration. The screens must be placed in the screen compartment according to the instructions for each individual machine.

69. The opening gate should provide grain flow of not less than 50% of the width of the screen. The screens for separating the grain must be selected according to the characteristics of the grain to be cleaned and coarseness so that the grain mixture covered one-half to three-fourths the length of the screen. Recommended installation of sifting screens in separators:

	Openings in mm	
	In First System	In Following System
For wheat	1.7 - 1.8 x 20	1.6 x 20
For rye	1.4 - 1.5 x 20	1.3 x 20

Remark: Before the first system of separation, it is recommended to install in a sifter screens with openings of 2.0 - 2.5 x 20 mm. The grain should be passed through these screens with the help of an auger and into a cockle separator.

70. Cleaning the grain in trieurs must mostly take out the longer-sized premixes. The cleaning could be counted as effective if 70% of the premixes are taken out.

71. For working surface of trieurs, it is recommended to establish the following screen openings in oat and cockle separators:

cockle separators -- basic diameter 4.25 - ~~5.0~~ 5.0 mm.

cockle separators -- control diameter 3.0 - 4.0 mm.

oat separators -- basic diameter 8.0 - 10.0 mm.

oat separators -- control diameter 9.0 - 11.0 mm.

72. The surface cleaning of grain must be accomplished without unnecessary scratching or splitting of grain and must accomplish the following:

	Surface Cleaning Machine with Abrasive Cylinder	Surface Cleaning Machine with Steel Cylinder
Lowering of ash in every system of husking or shelling in %	0.03 - 0.05	0.02 - 0.03
Increase of quantity of clean grain after each husking in % (not more than)	1	1

73. In order to do the scouring (husking) of the grain properly in abrasive and steel cylinder machines, it is necessary to take into consideration the quality of grain (vitreousness, moisture) and the load on the machine:

a. Adapt the working surface prepared from material No. 20 to No. 26.

b. Preset the gap between hammers to abrasive surface at 25-30 mm.

c. Preset the rotation of hammers -- for wheat 13 to 15 m/sec., and rye 15 to 18 m/sec.

74. The work of washing machine must provide good cleaning of grain and not less lowering of ash content than 0.07%.

75. For washing or moistening of grain, it is recommended to use water with a temperature of 30-50°; grain received for washing or moistening during cold weather should be warmed up to 10-15°. Traps must be installed to control the water after washing and to catch the grain.

Conditioning of Grain

76. For conditioning of grain for graded grinding, it is necessary to conduct the moistening, warm treatment, tempering and additional moistening before I break system. Conditioning procedure for each group of grain should be set up separately. Depending on availability of equipment, the conditioning should include moistening, warmup, steaming, washing, and tempering.

77. In setting up conditioning procedures, the temperature of the grain, water and air in the buildings where tempering is conducted should be considered.

78. In prpparation of wheat for graded grinding without special apparatus for conditioning, cold conditioning as described in Table 6 should be conducted.

Wheat	Average Vitreous-ness of Wheat	First Moistening in Moistening Apparatus Or In Wash Machine: Amt. of Moisten-ing in %	Tempering Time Hrs.	Second Moistening in Blazing Apparatus Before I System: Amt. of Moisten-ing in %	Tempering Time Hrs.	Moisture of Wheat Fed to Cracking System
Hard	--	Determined by Difference of Original grain and required for I cracking system	16-24	0.5-0.7	0.5-1.0	15.5-16.5
Soft	Higher than 60%		16-24	0.5-0.7	0.5	15.5-16.0
Soft	40-60%		12-20	0.3-0.5	0.3-0.5	14.5-15.5
Soft	less than 40%		4-12	0.3-0.5	0.3	14.0-15.0

Remark:

1. If the grain must be moistened more than 3-4%, it is recommended to do the moistening in three stages.
2. Wheat received for grinding with vitreousness of less than 40% and moisture 14-14.5% may be moistened only before I break system.
3. The conditioning table should be used for orientation purposes. To determine definite moistening requirement, it is recommended to check it in lab pilot mill.

79. In preparing wheat for graded grinding in mills equipped with special apparatus for conditioning with hot tempering, Tables No. 7 and No. 8 should be followed.

80. For preparing rye for graded milling, cold conditioning must be conducted as follows:

a. The moisture of grain delivered to the I break system - 13.5 - 15%.

b. The length of time to temper before I break system - 0.3 hours.

Table 7

The Illustration of Hot Tempering and Moistening of Soft Wheat

Average Vitreousness of Wheat	First Moistening in Moistening Apparatus or Wash Machine		2nd Moistening in Blazing Apparatus before I System		% Moisture of Wheat Delivered to I Cracking System
	% of Moistening	Tempering Time (hrs.)	% of Moistening	Tempering Time (hrs.)	
Above 60	Calculated taking moisture content before I system and moisture lost in conditioner to 2-3%.	8-12	0.5	0.5-0.75	15.5-16
40 to 60		6-10	0.3-0.5	0.3-0.5	14.5-15.5
Below 40		4-6	0.3	0.3	14-15

Remark: For hard wheat and wheat with high gluten content, the hot tempering is not obligatory.

Table 8

Illustration of Temperature Requirements for Conditioning

Index	Wheat with high gluten specific expansibility to 0.4 cm/min.	Wheat with normal glugen specific expansibility 0.4-1.0 cm/min.	wheat withlow gluten specific expansibility above 1.0 cm/min.
In preparing section Warmup temperature of grain	40-45	50-55	55-60
In drying section Temperature of air	70-75	75-80	80-85
In warm processing section Temperature of grain	35-40	40-45	45-50
In cooling section Temperature of outgoing grain	18-20	18-20	20-25

Remark: By processing grain in conditioners, the quality of gluten must be checked. The analysis is recommended to conduct according to"Instructions for Drying of Wheat by different methods" published in 1952.

81. For graded grindings of wheat and rye (wheat less than 14% moisture and rye less than 13%), the grain must be moistened.

82. For conditioning, the plant must have a definite plan for moistening and tempering, and a definite plan for filling and emptying the bins, and it must be followed at all times.

VII. Many Grade and One Grade 72% Extractions from Wheat

A. Principles for Process Setup

83. The many grade and single grade 72% extractions include following steps:

a. cracking process

b. Upgrading semolina and dunst

c. Grinding of semolina and dunst first quality

d. Grinding of semolina and dunst second quality

e. Grinding of end products

f. Control flour

It is possible to produce from first quality semolina and dunst, flour of higher and better quality. Second quality semolina and dunst produce mainly second grade but some first grade flours.

84. In setting up the grinding process, the following must be taken into consideration:

a. Three ends of technological lines

-- cracking process

-- polishing process, including grinding of by-products from polishing system.

-- grinding process.

b. Or two end lines of technological process

-- cracking process.

-- grinding process, which includes thepolishing and other systems.

-- ~~grinding process, which in~~

The creation of three technological lines is possible by additional quantitative processing.

85. In cases where soft wheat is ground and hard wheat should be added, taking into consideration the technological and conveying possibilities, it is recommended:

a. to conduct separate grinding of soft and hard wheat in the first three or four break systems, storing in bins with conveying device, and also shelling and grinding in first two or three grinding systems.

b. grinding mixture of hard and soft wheat.

86. In setting up a procedure for many grade and single grade 72% extraction wheat, it is necessary to follow the standards and instructions in Appendix No. 4 and Table 9.

Table 9

Norms for Setting up the Schemes for Graded Grinding of Wheat

Kind of Grindings	No. of Systems: Break	No. of Systems: Shelling and Grinding	Ratio of Long Rolls for Grinding and Shelling Systems	Ratio of Sifting Surface for Grinding and Shelling System	Ratio of Sifting Surface to Total Surface Material %
Triple with total 78% extr.	5-7	15-19	1.2-1.5	1.0-1.2	10-14
Twice with total 78%	5-6	10-13	1.1-1.3	0.8-1.2	10-12
Once with 72% and twice with 70% extr.	5-6	15-17	1.4-1.6	1.0-1.2	10-12

Remark: 1) A smaller number of systems is permitted by not having enough equipment.

2) Smaller ratios, accepted for grinding and shelling systems, must be changed for processing grain with low vitreousness.

87. The sifting machines separate the particles according to size. In mills conducting graded wheat grinding, standard screen box capacity has been set at 200-300 kg. of grain in a 24-hour period for a screen box with a width of 1 cm. For grinding flour grits, and hard wheat for the macaroni industry, the standard screen box capacity has been set at 150-200 kg. of grain in a 24-hour period for 1 cm. wide screen box. For single grade 85% extraction wheat, the capacity is set at 600 kg. grain for 1 cm. wide screen box. The load in each system is distributed on 1 cm. wide screen box as follows:

enriched coarse grits	within 220-280 kg in 24 hours
enriched middle grits	within 160-200 kg in 24 hours
enriched fine grits	within 140-160 kg in 24 hours
enriched hard dunst	within 100-120 kg in 24 hours

For grits of second quality, the load is lowered by 25%.

88. The procedure for graded grinding of wheat is set up as follows:

a. Development of break process; if the mill has enough equipment, the coarse and fine materials are ground in separate break systems, II, III, IV and V, and also sifted separately.

b. The sifting of ground products from I, II, III and IV break systems (if the mill has enough equipment) in two consecutive stages; receiving separately on the first stage coarse and fine middlings, and crushed and coarse midds, and on the second stage, separately middle and fine midds, dunsts and flour.

c. Selection of middlings and dunsts of first quality from I to III break systems including: middlings of second quality from IV break system and dunsts of second quality from IV to VI break system.

d. In order to obtain good separation of each stream of middlings:

-- coarse middlings - separate grinding for each break system (in the mills having small capacity, I and III break systems may be done together).

-- middle grits from I, II and III break systems - separately or together, and from IV break system - separately.

-- fine middlings from I, II, III break systems after sifting out the flour and dunsts - separately or together, and from IV break system - separately.

-- hard dunst - separately; it is allowed to mix the dunsts from II and III break systems.

e. By developed sizing process, coarse and middle grits after purifying, and also fine grits after benefication from sizing process, are directed again to the sifters.

f. Middlings and dunsts of first quality should be ground on first 3-4 grinding systems with the maximum extraction of flour of highest quality.

g. Before grinding middlings anddunsts of second quality on middle grinding systems (6th to 7th), for maximum extraction of first grade flour, the grain should be passed through the screening system for enrichment.

h. Application of roll stands, hammer and sizing machines for careful grinding of products in break process. Depending on the quality of the grain to be ground and the capacity of the systems, it is recommended to adapt propeller (hammer) machines for finishing of oversizes, starting from III break system; for mills with not enough roll stands, propeller machines may be used for the last systems (starting from V break).

i. Tailings from sizing and grinding systems ground separately or in combination must be finished in brush equipped machines or centrifuges.

j. Flour streams from each system must be arranged according to grade, with careful sifting and mixing before being directed to storage bins.

k. Dust from filters and sifters must be directed to a separate screening operation.

l. Bran must be resifted (if possible) in control sifters or centrifuges before being directed to the bin.

89. In setting up the procedures for conducting many-graded and single grade extraction of 72% wheat, it is necessary to observe the following requirements in grinding, sifting and sizing:

a. For the first four breaks in the sizing and grinding systems, the diameter of the rolls must not be more than 250 mm; in the grinding systems 300 mm is permitted.

b. The established rotation for fast roll is 6 m/sec.; for grinding of products in the first three grinding systems, the rotation must be increased to 8-10 m/sec.

c. The ratio of rotation for fast and slow rotating rolls is:

-- in break and cracking systems	2.5
-- in sizing and tailing systems	1.5
-- in grinding and middling systems	1.5
-- in germ systems	1.0

d. The number of corrugations, their spiral arrangment and ratio of fast to slow rotation, depends upon the quality of product to be ground. (See Appendix No. 5, 6 and 7).

e. Depending on the technological properties of grain, the following reciprocity of corrugations on the rolls placed in the stands is recommended:

-- on I break system - "dull to dull" for vitreousness higher than 60%; "sharp to dull" for vitreousness from 40 to 60%; and "sharp to sharp" for vitreousness of less than 40%.

-- on II and III (coarse and fine) and IV (coarse) break and cracking systems - "sharp to sharp".

-- on remaining break systems - "dull to dull".

f. On all the grinding systems, the corrugations on the roll surfaces should be 10-11 corrugations per 1 cm. Corrugations on the first 2-3 sizing systems should be "sharp to sharp", but on the rest of the sizing, grinding and tailing systems "dull to dull".

g. Condition of corrugations should be checked regularly and exchanged for new ones when necessary.

h. The upper and lower rolls should be exchanged at the same time.

i. Rolls must be sized before cutting and must be cut by engraving. Sharp rolls should have 20 to 40° edges, and dull rolls should have 60 to 80° edges. Interlocking rolls should have 90 to 110° edges. Larger edges and facets should be used for the last break, sizing, grinding and tailing systems.

j. To establish the load on the roll stands and on the sifting system, in order to balance the grinding, Table 10 has been set up.

Table 10

The orientation for load on roll stands and sifting systems for graded grinding of wheat

System	Load on Roll Stands in kg/cm/24 hrs.	Load in t/24 hrs. on 1 of sifters Mark 5 PM
I Break	1400-1800	110-120
II Break Grits)	700-1000	75-85
II Break Fine Grits)		60-70
III Break Coarse Grits)		50-60
III Break Fine Grits)	450-600	35-45
IV Break	300-450	25-35
V Break	200-30	20-30
VI Break	120-150	20-25
VII Break	120-150	20-25
1st, 2nd, 3rd 4th Break Flour: Sifting	--	30-50
1st Sizings Coarse)	250-450	40-60
2nd Sizings Fine)		
3rd Sizing 2nd qualtiy	300-400	35-45
4th Sizing	250-350	30-40
5th, 6th Sizing	200-300	25030
7th, 8th Sizing	130-200	20-25
1, 2, 3, 4, 5th grindings or middlings	250-300	35-45
6th, 7th, 8th grindings or middlings	150-200	25-30
9th, 10th grindings or middlings	130-200	20-25
1st tailings	200-300	25-30
2nd tailings	130-200	20-25
Control	--	30-40

Remark: The load for propeller (hammer) machine is claculated at 700-900 kg on 1 m^2 area of cylinder screen.

k. For selecting flour from separate systems, silk screens of the following numbers should be used:

-- for flour from breaks - 23-25

-- for flour of highest grade - 38-46

-- for flour of first grade - 35-43

-- for flour of second grade - 32-43

Remark: Instead of silk screens, it is permitted to adapt screens of capric material, which is bulkier than silk and should be used 2-3 numbers larger.

l. For control sifting of the flour, screens should have openings one or two numbers smaller than those used in the sifting system.

m. Taking into consideration the load on each screen, the consistency of material, and the screen openings, the following errors are permitted.

-- Overs of break systems not more than 5-10%, and of grinding systems not more than 10-15%.

-- Lower passes of break and grinding systems, not more than 10-15%.

-- Dunsts entering the system, not more than 10-20%.

n. Sifters should be utilized to the fullest advantage, separating the breaks into fractions of the same size, according to the requirements outlined in paragraph No. 96.

B. Grinding Procedure

Break Process (Separation of Middlings and Dunsts in First Four Breaking Systems)

90. The Process for grinding in the first four break systems must give the maximum quantity of breaks, dunsts of highest quality, and the minimum quantity of flour.

91. In many-graded wheat grinding, Table 11 should be taken into consideration.

Table 11

Illustrated Procedure for Grinding Grain in Break Systems

	Break Systems			
	I	II	III	IV
Passage through Screen No.	1 (19)	1 (19)	080 (24)	056 (32)
% of Product Directed to the Given Systems	8-15	45-55	40-50	30-40

Remark: Extraction in the systems depends on the structure of the grain and the number of break systems. The old numeration of sieves is shown in parenthesis.

92. For proper grinding in I, II, III, and IV break systems to obtain grits and dunsts, Table 12 should be followed.

Table 12

Extraction of Grits and Dunsts in Break Process

(The figures for extraction of grits and dunsts from grains of different vitreousness are shown in Appendix No. 8.)

Products Resulting from Break Process	% of Weight of Grain Delivered to the I Break System		
	Wheat with Vitreousness above 60%	Wheat with Vitreousness 40-60%	Wheat with Vitreousness Below 40%
Grits (coarse, middle, fine) 1st Quality	55.0	51.0	46.0
Grits 2nd Quality (from IV break system)	4.5	4.0	3.5
Dunst (I-IV break systems)	11.5	13.0	14.5
Total of Break - Dunst Products	71.0	68.0	64.0

Sizing of Grits and Dunsts

93. Grits must be divided in the following groups of coarseness:

coarse	71/120
medium	120/160
fine	160/200
hard dunst	200/27
soft dunst	27/38

The first figure is the number of sieve through which the grits will pass, and the second figure is the number of sieve on which the grits will stay. The numeration of sieves corresponds to the order from GOCT 4403-56 and is appended in Appendix No. 19 and 20. The old numeration of sieves is also listed.

94. The sizing process must accomplish utmost separation of grits and dunsts, reaching the endosperm before it enters the middling system or the grinding system. It is therefore necessary to:

a. The grits to be directed into further streams should be separated in the sifters. They have the following appearance.

-- endosperm in the form of grits free or almost free of bran.

-- endosperm in the form of grits containing very little bran which can be removed by roll grinding.

-- bran containing small particles of endosperm, which is converted to dunst or fine grits in subsequent sizing systems.

-- bran containing endosperm which is converted to flour in roll stands.

b. to separate the bran from adherent grits in the sizing system.

c. to separate by continuous screening the stream coming in from the sizing system.

95. Effective benefication of grits and dusts is attained:

a. by proper selection and distribution of screens in the sifters, as recommended in paragraph No. 96.

b. by proper selection of screens in the sifters and aspirators, optimum distribution of grits on the screens, and delivery of proper amount of air through the layer of grits.

c. by proper functioning of sizing system.

96. The mixture of grits entering the sifters (aspirators) must be of the same coarseness or size. The amounts of fine and coarse fractions in limited groups of grits, shown in paragrph 93, must not exceed: 25% in coarse grits, 35% in middle grits and 40% in fine grits. The control of these grits must be conducted in laboratory sifters, sifting 100-gram samples for three minutes.

97. Aspirators must supply air streams through the sifters as listed in Table 13.

Table 13

Amount of Air (in m^3/min.) Which Must Pass Through the Sieves

Grits & Dusts	Amount of Incoming Air in Sifters (m^3/min.)	
	500 mm Sieve	400 mm Sieve
Coarse Grits	66	53
Middle Grits	50	40
Fine Grits	40	32
Dust, Hard	37	30

98. Grits from all sifting systems must have the following characteristics:

a. Gritspassing through the sifters and directed to the sizing system must consist mainly of endosperm, with very little bran.

b. Grits passing through the sifters and directed to the grinding system preferably should contain only endosperm.

c. Leaving the sifters, the grits must not contain particles which are rich in endosperm.

d. The ash content of grits passing through the sifters under normal conditions must not be lower than that of grits obtained from a sifting operation whose air stream was interrupted 3-5 minutes. The ash content must not deviate more than 30% from the standard ash content for grits entering the grinding system and not more than 20% for grits entering the sizing system.

e. The ash content of grits is upgraded during sifting from 2-2.5 times for coarse grits and 1.5-2 times for middle and fine grits.

99. Depending on the mixture of grits conveyed to the sizing system in the sifters and the designated quality of grits in the sizing fraction, the absolute tolerance in ash content is as follows:

a. Ash in sized grits (fine grits and dunst 1st quality) conveyed to the first three grinding systems must not exceed the ash content of the endosperm by more than 20% for endosperm with an ash content of 0.45-0.55% or more than 25% for endosperm with an ash content of below 0.45%.

b. The ash content of sized grits of 1st quality conveyed to the middlings system must not exceed 1.2% (coarse grits), 1.0% (middle grits) and 0.85% (fine grits).

c. The ash content of sized 2nd quality middle and fine grits conveyed to the grinding system must not be higher than 1.30%.

d. The ash content in some of the streams of grits conveyed to middling systems can approach 2.5% and in some cases 3.0% (depending on the type of wheat).

100. It is necessary to direct to the middling system:

a. Coarse grits - sized grits from I and II break systems and also from III break system if the ash content does not exceed 1.2%.

b. Fine grits - sized middleand fine grits from I, II and III break systems.

c. 2nd quality - sized middle and fine grits from IV break system.

d. Tailing products - middle grits from IV break system, tailings from sifters, coarse grits from III break system (depending on quality, with ash content from 1.2 to 2.5%) and tailing products from certain middling systems.

101. In producing grits of 1st quality in the roll stands of the 1st and second middling systems, maximum separation of bran is necessary. The product must not contain more than 12% flour by weight (thru silk sieve No. 38) when entering the system. In the 3rd and 4th middling systems, flour should not exceed 15%.

102. ~~In producing 2nd quality grits~~ To separate the maximum of bran, ~~it~~ not more than 18% of the second quality grits may be separated as flour.

103. Grinding in the middling system must achieve the maximum separation of bran.

Grinding 1st and 2nd Quality Grits and Dunsts

104.

~~105~~. Grinding of 1st quality grits and dunsts (with the exception of grinding in which ~~the~~ flour-grits (farina) are produced) must obtain the maximum quantity and quality of flour in the first three grinding systems. The procedure of operation for these systems must be arranged so that the flour extracted thru a No. 43 sieve in each system is not less than 35% of the weight of material entering the ~~each~~ sifter.

105. In grinding of 2nd quality grits and dunsts, the system must be arranged so that ~~increase of~~ flour extracted through a No. 38 sieve in each system is not less than 20% of the weight of material entering the sifter.

Grinding of Final Products

106. Grinding in the break process must result in full extraction of endosperm and in further work in roll stands, propeller machines, brush machines, centrifuges and other systems to obtain flour containing as little bran as possible. The flour extraction through a No. 38 silk screen in each break system must be 5-8% of the product weight entering the given system.

107. The middling and grinding processes must x accomplish full extraction of endosperm. The flour extraction through a No. 38 silk screen in these systems must be 10-15% of the product weight entering the given system.

Control of Flour

108. The grades of flour by multigrade grinding are formed from streams leaving separate systems. The grades must be formed in order to set up the assortment for mill and for distribution and to supply the highest quality flour of each grade.

109. The farina is taken from enriched grits of 1st quality. Farina must contain uniform size endosperm without bran and soft mealy material.

110. Highest grade flour is formed from streams leaving 1st, 2nd and 3rd grinding systems.

111. First grade flour is formed from streams leaving 4th, 5th, 6th and 7th grinding systems from 2-4 middling systems, and system for sorting out the grits and dunsts of 1st quality.

112. 2nd & grade flour is taken from streams from break systems, systems for sorting of grits and dunsts of 2nd quality, and the last sizing and middling systems. Flour must have the lowest obtainable bran content or be upgraded. For 2nd grade flour, special attention must be given to the quality of streams in the grinding system.

113. Every grade of flour should be mixed and sifted in control sifters in order to remove the coarse particles which fall in due to broken sieves, etc.

114. After control sifting, the overs must not exceed 5% of the flour sifted.

115. Farina is selected from coarse grits from the II break system and is sifted twice. Before delivery to storage, it must be put through an aspiration column.

VIII. Single Grade Grinding of Wheat with Extraction of 85% Flour, and Graded Grinding of Rye

A. Basic Principles for Setting up the Technological Process

116. In single grade grinding of wheat with extraction of 85% 2nd grade flour, and graded grinding of rye, the process must achieve the standard amounts of flour and maximum quality improvement; and by two-graded grinding of rye, must obtain the highest possible amount of sifted flour and better quality of both grades.

117. The single grade grinding of wheat with extraction of 85% flour, and graded grinding of rye, must include the following process steps:

a. Grits must be removed in the first two break systems.

b. Grits must be ground with sized coarse and fine grits by single grade 85% extraction on the first grinding systems.

c. Grinding in break and grinding systems.

d. Control flour.

118. In setting up the scheme for single grade 85% extraction grinding of wheat and graded grinding of rye, it is necessary to follow the standards in Appendix No. 4 and Table 14.

Table 14

Quantity and Correlation of Process in Break and Grinding Systems

Type of Extraction	Number of Systems		Roll Length in Grinding System in Ratio to Break	Sifting Surface of Grinding System in Ratio to Break	Sifting Surface for Control in % to Total Surface
	Break	Grinding			
Wheat - single grade 85% extraction of flour	4-5	4-6	0.6-1.0	0.6-0.85	12-15
Rye - single grade 63% extraction of flour	6-7*	6-7	0.7-0.9	0.7-1.0	10-12
Rye - two graded 15-65% extraction of flour	4-5	3-5	0.5-0.8	0.5-0.8	15-17
Rye - single grade 87% extraction of flour	4-5	1-2	0.2-0.35	0.2-0.4	8-10

* Including small fractions

119. In setting up the procedure for single grade 85% extraction of wheat, the following order is advised:

a. Remove the grits from I and II break systems.

b. The coarse grits from I and II break systems should be sized in separate systems to remove the farina after dual sizing of coarse grits from II break system.

c. The grits should be ground in the 1st, 2nd, 3rd and 4th grinding systems.

d. The products from the break and grinding systems should be finished in the propeller (hammer), brush machines and centrifuges.

e. There must be a sufficient number of sifters for separate and control sifting of the separate streams and systems, as recommended for each grade of flour, with close quality control and subsequent thorough mixing together. The technical characteristics of grinding are illustrated in Appendix No. 12.

120. In setting up the single-grade grinding process for rye with 63% extraction of flour, it is necessary to:-

a. to utilize the special system for prebreaking of grain before the break process.

b. to remove grits and dusts from I, II and III break systems.

c. to grind grits in 1st, 2nd, 3rd and 4th grinding systems.

d. to finish the products received from break and grinding processes with propeller (hammer) and brush machines and centrifuges. On the last (starting with IV break) systems, propeller (hammer) machines may be used instead of roll stands.

e. to control sift the flour with close quality control and subsequent mixing. The technical characteristics of the grinding process are illustrated in Appendix No. 13.

121. In setting up the process for two-graded (15 + 65%) grinding of rye, it is necessary to:

a. remove grits from I and II break systems and to grind in the 1st and 2nd grinding systems.

b. to grind the products received from the break and grinding processes on III and following break systems, and on the 3rd and 4th grinding systems with propeller and brush machines and centrifuges.

c. To remove sifted flour from II and III break systems, and from 1st and 2nd grinding systems. Technical characteristics of the grinding process are illustrated in Appendix No. 14.

122. In setting up the process for single grade 87% extraction of rye, it is necessary to:

a. remove the grits from I and II break systems.

b. to grind the products received from break and grinding processes starting with III break system using propeller and brush machines and centrifuges. Technical characteristics of the grinding process are illustrated in Appendix No. 13.

123. In setting up the process for single grade 85% extraction of wheat and graded grinding of rye, paragraph No. 89 (a through j) must be followed with the following additions.

a. For single grade 85% extraction of wheat flour and 87% rye flour, and for a two-graded grinding of rye, the ratio of speed for fast and slow rotating rolls should be set at 2.5.

b. No. 32-43 silk screens should be used for wheat, No. 29-35 for sifted rye, and for cracked rye - metal or coarse silk No. 160-210.

B. Grinding Arrangement

124. For single grade 85% extraction of wheat flour and graded grinding of rye, this arrangement must be followed:

a. grinding and sifting pr of products in break systems, with separation of grits in amounts substantial for full load on grinding systems, and also production of flour with lowered ash content.

b. grinding of grits in order to obtain the maximum m quantity of best quality flour.

c. Careful grinding of products received from break and grinding processes w ith with lowest possible bran content.

125. For single grade 85% wheat extraction and graded grinding of rye, the following table is recommended for grinding arrangement on break systems:

Table 15

Illustration for Sizing of Grain

Grind	Illustration or Index	Break Systems: Cracking or Prebreak	Break Systems: I	Break Systems: II
85% wheat single grade	Thru sieve No.	--	1 (19)	1 (19)
	% Extr. by Wt. of Prod. Received in Given System	--	25-30	56-60
65% rye single grade	Ring Thru Sieve No.	190 (50)	0.8 (24)	018 (24)
	% Extr. by Wt. of Prod. Received in Given System	to 1	25-35	35-45
15 + 65% rye two grade	Thru Sieve No.	--	0.8 (24)	0.8 (24)
	% Extr. by Wt. of Prod. Received in Given System	--	25-35	40-45
87% rye single grade	Thru Sieve No.	--	0.8 (24)	0.8 (24)
	% extr. by wt. of prod. Received in Given System	--	30-35	45-55 (46-55)

IX. Grinding of Both Wheat and Rye

A. Designation and Structure of the Process

126. In grinding of wheat and rye to obtain combined flour, the recommended amounts of each must be used and the standards for quality must be met.

127. Grinding of both wheat and rye is accomplished in roll stands or other grinding machines.

128. In setting up the process for grinding of wheat and rye, it is necessary to follow the standards shown in Appendix no. 4.

129. In setting up the process for grinding of both wheat and rye, it is necessary to:

a. Use 2 to 4 ⅌ systems.

b. Preset the rotation speed for fast rotating rolls at not less than 6 m/sec. ⅌

c. The number of corrugations on I break system must be 5 per 1 cm. circumference, and in the last system, 7 corrugations per 1 cm. circumference, with a slope of corrugations of 12 to 14%.

d. For producing wheat and rye flour in separate systems, metal screens No. 8-067 must be used.

e. For finishing the overs at the tail end, propeller (hammer) machines should be used.

f. Control sift the flour before conveying to the bins, using control sieves of one or two numbers smaller than the ones in the systems (Appendix No. 17). The loss in control sifting must not exceed 2.0% of weight of product received for control sifting.

B. Grinding Arrangement

130. The arrangement for grinding and sifting of wheat and rye must be done as follows:

a. the maximum extraction of flour in the first two systems.

b. the minimum return of unground intermediate product from the last system to the previous system. The quantity of returned product must not exceed 2.5-3% of weight of grain received for grinding.

131. In grinding of both wheat and rye, the following illustration (Table 16) is recommended for grinding in break systems.

Table 16

Sizing Arrangement for Wheat and Rye Ground Together

	Break Systems	
	I	II
Sieve No.	0.67 (27)	0.67 (27)
% Retr. by Wt. of Prod. Received in Given System	35-45	55-70

X. The Production of Flour from Hard Wheat for the Macaroni Industry

132. The hard wheat received at the mill for use in production of macaroni flour must not contain more than 10% soft wheat.

133. The grinding of hard wheat must produce the finest quality flour (macaroni grits and macaroni half grits) resulting in better quality in all grades of products.

Remark: The quality of grinding of hard wheat for the macaroni industry must meet the standards of VTU No. 419 and 420 (see Appendix No. 1)

134. In setting up the process for preparing hard wheat for x grinding, proper arrangement of equipment is recommended: first separation, cleaning in triuers (cockle and oat cleaner), first scouring (abrasive machine with steel cylinder), second separation, washing of the grain (followed by tempering in the bins), scouring (shelling) machine with abrasive x cylinder, third separation, stone removal, brush machine, aspirator, additonal moistening of grain (one-two-multiple).

Remark: If additional grain brush machines areused, the scouring machines with abrasive cylinder after washing of grain are not necessary.

135. The following production standards for grinding equipment are recommended:

a.	quantity of grain in kg on 1 cm length of rolls in 24 hours	75-90
b.	quantity of grain in kg on 1 m^2 sifting surface	650-800
c.	quantity of grain in kg on 1 cm width of screens in sifters	150-200
d.	required HP for grinding 1 ton of grain per 24 hours	2.6

136. In preparation of wheat for grinding, cold conditioning is used. See Table 6.

Remark:

(1) For grain with moisture of 12% or less, it is recommended to moisten grain before [illegible] scouring (for example, to raise the moisture 1% requires 4 hours).

(2) It is recommended before I break system to moisten the grain in two steps: the first step - 0.5-0.6% tempering in 1-1.5 hours, and the second step - 0.2-0.5% tempering in 20-30 minutes.

137. The grinding of hard wheat for the macaroni industry must include the following steps:

a. break process with removal of grits and dunsts of 1st qualityfrom I-IV break systems and dunsts of 2nd quality from V-VI systems.

b. Sizing of coarse, middleand fine grits from I-III break systems and middle and fine from IV break system.

c. Sizing of coarse and middle grits with resulting enrichment.

d. Grinding of grits in order to obtain finest flour of macaroni grits and macaroni half grits.

e. final grinds of break systems (starting from IV) and the last 3-5 grinding systems.

f. Control flour.

138. In setting up the grinding process for hard wheat, the following standards must be observed.

a. Number of systems: Break, 6-7; Sizing and grinding, 14-16.

b. The ratio of length of rolls in grinding systems to length of rolls in break system is 1.3-1.5 and the ratio of sieve surface is 0.8-1.2. For a control operation, 10-12% of normal sifting surface.

139. Grinding in the first four break systems must provide the maximum quantity of highest quality grits and dunsts and the minimum quantity of flour. It is recommended to observe the following grinding characteristics: extraction on I break system 8-15%, on II - 40-45%, on III - 15-20% (of the weight of product entering in I break system), in total of three break systems 70%.

140. On all sizing and grinding systems, rolls with fine corrugations are chosen (10-11 corrugations on 1 cm. circumference of roll with 4-6% slope). For last two grinding systems, smooth surface rolls are recommended. Arrangement of corrugations for break systems and grinding systems - dull to dull.

141. After IV break system, it is recommended to grind products received from break process in roll stands using brush machines and centrifuges.

142. The following order is recommended in forming the grades:

a. highest grade (macaroni grits) - from middle grits from first three break systems (after they have been through sifters) and from 1st and 2nd

a sizing systems for products of 1st quality with established control of ready grits in special sifters.

b. First grade (macaroni half grits) - from streams of particulated flour, taken off first grinding systems, working on a sizing machine principle, for for separation of largest possible quantity of fine flour and part of dunts from first break systems; controlled with sifting.

c. Second grade flour is taken off as a kind of fine flour from all systems; controlled with sifting.

d. For taking of the flour from separate systems for grading, silk screens with the following numbers are used:

for macaroni flour of highest grade (grits)	130-150
for macaroni flour of first grade (half grits)	190-120
for flour 2nd grade	35-46

e. It is permitted to utilize for macaroni industry the flour from soft wheat with high vitreousness (not less than 60%) the production results must correspond with Table No. 1 and Appendix No. 1; the grindin g is conducted as for hard wheat; for selection of grades of flour the following silk screens should be used:

for highest grade (grits)	150-170
for first grade (half grits)	190-240
for 2nd grade	35-46

XI. Distribution & Packaging of Product

143. For distribution and packaging of product, clean sacks with no holes, no odours and no infestation must be used. The distribution of products and railings must be correctly recorded.

144. For distribution every sack of product must be weighed. The correctness of weight must be checked systematically.

145. The sewing of sacks must be durable in order to eliminate losses due to storage and transportation; the sacks sewed by hand must have a minimum of 10-11 seams.

146. Every sack of product must be marked according to standards.

147. The assistant miller and the chief of distribution or senior distributer systematically checks the weight of product in sakes and also the marking and sewing.

XII. ACCOUNTING FOR GRAIN AND PRODUCTS IN PRODUCTION

ACCOUNTING FOR SACKS

148. Every presses has organized accounting:

a. quantity and quality of grain entering grain cleaning department

b. Quantity and quality of grain entering milling dept. after cleaning.

c. quantity and quality of produced flour, farina, bran and tailings.

d. Quantity of empty sacks received in packaging department and delivered with product to storage.

The results are recorded at the end of each shift.

149. The above data are recorded in the shifts journal of the head of technological department and in the mill laboratory mill journal.

150. Every ten days the mill reports the results of theoretical calculations for grain milling and also the f actual results of product and tailings produced.

151. To determine the monthly results of work in the mill and products produced, the grain received, used in production and remaining in storage must be accounted for. The same applies for flour, bran and tailings.

152. When starting up the mill after major repairs or after complete cleaning and disinfecting of equipment, preliminary grinding ("pregrinding products") is conducted which must not exceed three 24-hour periods. The distribution of such

153. The setup for formulation of operation with grain, ready products and sacks is regulated by special instruction. The instructions are published by Main Flour Ministry, Pagotizdat, M., 1955.

XLII. THE CONTROL OF TECHNOLOGICAL PROCESS

154. In order to conduct strict technological discipline and to achieve progressive results for receiving and arrangements of grain to be ground, producing highest quality products and utilization of grain and equipment in each mill, the control of technological process must be organized:

a. Laboratory - the setup ТХК (techno-chemical control) for laboratory standards for certain points in technological process and actual sampling and analysis.

b. In working places - supervisory personnal.

155. The control of technological process must be conducted according to the schedule (graphic) which is worked out in each mill by the head of techno-chemical control, or chief of laboratory and head miller, and is approved by the head engineer of the mill. Schedule (graphic) must contain:

a. The objects for control (the whole process, its steps, the systems and machinery.)

b. Places and means of taking samples.

c. The indices and means of analyses.

d. Continuous and periodical control.

e. Accuracy in control.

156. Knowing the results of control, which are recorded in journal of technological process, the head miller and the assistant millers take steps to improve or correct the discrepancies in technological process.

157. The ТХК (techno-chemical control) department provides the control of certain regulations for techno-chemical control and instructions for work in laboratory.

158. The supervisory personnel of the mill comply with operational control in the following manner.

1. Studying the technological and bread baking properties of grain received in the mill from different districts and combination of grains for grinding:
   a. employee, designated by head miller, selects the samples which are ground on laboratory mill; at the same time, grain and flour samples are techno-chemically analyzed, and flours are bake-tested.
   b. The elevator employees periodically control the amount and quality of grain to be delivered for grinding according to the instructions (Form 12).
2. In preparing the grain for grinding in the cleaning department, the cleaning machinery is arranged:
   a. to check the cleaning action on grain mixx in order to properly separate damaged from good grain.
   b. To check the proper functioning of conditioners, warmers, temperature of grain.
   c. Periodically check the functioning of the moistening apparatus.
   d. Continuously check the conditions of grain in storage and properly unload and reload the storage bins.
3. In the course of grinding, subjective and screening analyses are conducted on the first 3-4 break systems and periodically the flours from sizing and grinding systems are checked according to rules 91, 101, 102, 103, 104, 105, 106, and 107.
4. At intervals, subjective checks are made for product quality entering the sifters and leaving sifters; also tailings.
5. During sifting of the ground products, subjective checks are made on the flour for color and impurities; tailings are also checked in order to detect improper sifting. On request by the assistant miller, separate samples of flour and tailing products are checked for screening analyses on laboratory screen

6. For general examination of the results of the milling process, the actual attainment of standards for flour grades and tailings is determined every 1-2 hours.

7. In order to keep a complete and accurate account of the graded grinding purposes, the head engineer, with the help of mill personnel and the technochemical control laboratory, periodically conducts a quality and quantity balance check on grits and dusts from the first four break systems and on flour from all break, sizing and grinding systems.

Upon completion of repairs in the mill and also after switching from one kind of grinding to another, a complete quantity and quality balance of grinding is conducted, and the technological process is regulated according to established knowledge. When taking a partial or full balance of grindings, it is advised to follow special instructions.

APPENDIX 1

THE QUALITY STANDARDS OF PRODUCTION

Name of Product	% Ash Content (not more than)	% on Screen (not more)	% Through Screen No.	Color (subjectively)	Bran Cont. %	Rules Given by
A. Wheat flour for bread baking						
Best Flour	0.60	23/2*	35/10 not more	White or silicious with yellow shading.	30	Order from Komisiriat 8th of April 1938 No. 1084
Highest grade	0.55	53/5	--	White or white with silicious shade	28	
First grade	0.75	35/2	43/75 not less	White or white with yellow shading	30	
2nd Grade	1.25	27/2	38/60 not less	White with yellow or grey shade	25	
Both	Not less than 0.07% lower than before cleaning	067/2	38/3 not less	White with yellow or grey shade, with noticeable parts of bran	20	UTUI-53
B. Rye flour for bread baking						
Sifted	0.75	27/2	38/90 not less	White	--	GOST 7045-54
Pearled	1.45	045/2	38/60 not less	Grey-white	--	
Both	2.0: Not less than 0.07% lower than before cleaning	067/2	38/30 not less	Grey-white with noticeable particles of bran	--	
C. Flour for macaroni from hard wheat						
Highest grade (grits)	0.75	140/3	260/12 or 27/12 not more	Yellow and silicious with yellow shading	30	VTU No. 420 with changes

First grade (half grits)	1.10	190/3	43/35 not more	Yellow and silicious with yellow shading	32	VTU No. 420 with changes
Second grade	1.80	27/2	30/60 not less	Silicious with yellow shading	25	VTU No. 419 with changes
D. Macaroni flour from soft wheat						
Highest grade (grits)	0.55	150/3	260/15 or 27/15 not more	White with yellow shading	30	VTU No. 1-58 with changes
First grade (half grits)	0.75	190/3	43/50 not more	White with yellow shading	30	
E. Farina						
Mark M	0.65	--	23/8 or 38/2 not more	Predominantly transparent mealy grits with even white color	--	
Mark MT	0.75	--	23/5 and 38/1 not more	Predominantly transparent mealy white grits with marginal half-mealiness of grits with silicious or yellow color	--	GOST 7022-54
Mark T	0.85	--	23/5-38/1 not more	Half mealy grits with silicious or yellow color	--	
E. Flour of both - rye and wheat	Not less than 0.07% lower than before cleaning	067/2	38/30 not less	Grey-white with noticeable particles of bran	--	BTU 265 53/II

* The first number is the number of the screen; the second number is the overs or throughs in %.

Remark: 1) The flour of wheat to be used for bread baking is manufactured from soft wheat with vitreousness of not less than 40% premixing hard wheat in quantity from 15 to 20% or from soft wheat only with vitreousness of not less than 50%.
2) The bread baking flours of highest, first and 2nd grade and both are manufactured from soft wheat or soft wheat with premix of not more than 20% hard wheat.

Common Standards for all Grades of Production

1. The grain conveyed to grinding, after cleaning, must have these requirements:
   a. Should not contain more than 4% of germinated barley or rye; in that amount there should not be more than 3% germinated grain.
   b. Should not contain more than 0.05% of pernicious seeds; in that amount there should not be more than 0.04% water-pepper or others (separately or together).
   c. Should not contain more than 0.1% cockle.
   d. Should not cintain heliotrope or worms.

Remark: 1) The germinated grain content in rye and wheat is determined by analysis before cleaning.

2) Cockle and barley premix content is determined by analysis after cleaning.

2. Odor: Normal flour should not have sour, bitter or other foreign tastes. the oder of metals, molds or others.
3. Taste: Normal flour should not have sour, bitter or other foreign tastes.
4. Mineral premixes Content: In chewing the flour, there should be no crunchy particles.
5. Moisture content: Bread baking flour - not more than 15%; farina and macaroni flour - not more than 15.5%.
6. Quality of raw bran in wheat flour - not lower than 2nd group.
7. At all times the warehouse must be protected from pests and infections.
8. Metals content in one kg. of flour: not more than 3 mg; a single particle of metal should not weigh more than 0.4 mg and should not be more than 0.3 mm in length.

Appendix 2

RULES FOR INSTALLATION AND MAINTENANCE OF MAGNETS IN THE MILLING OPERATION

1. Place of installation and the standard protection requirement.

In order to prevent falling of chipped metal pieces from into product and for the separation of metal pieces from the product, the magnets should be installed according to the standards and places as illustrated:

Basic Points for Installation	On single unit, measured in 8/24 hrs.	The Norms: In Mills with Metal Conveying System — Magnetic Apparatus in M	The Norms: In Mills with Metal Conveying System — No. of Horse Shoes	The Norms: In Mills with Wood Conveying System — Magnetic Apparatus in M	The Norms: In Mills with Wood Conveying System — No. of Horse Shoes	Remark
A. In Cleaning Dept.						
After 1st pass thru separators	On 100 t of grain	1.2	20	1.2	20	
Before each pass through scouring or abrasive machine with abrasive cylinder or washing machine	The same	1.0	15	1.0	15	
After last pass through separators	The same	-	20	-	20	
B. Grinding Dept.						
Before 1st break roll stands	On 100 t of grain	1.5	12	1.3	12	
Before other roll stands of break-grind systems	On 1 m length of rolls	-	6	-	4	
In graded grinding before roll stands	"	-	10	-	8	
In both grindings before the last roll stand	On 100 t of grain	0.6	10	0.6	5	For returning product
C. Production Control						
Flour of graded grinding: a) passing thru screen to No. 29	On 100 t of flour	1.7	-	1.4	-	
b) passing thru screen after No. 29	"	1.5	-	1.2	-	
Farina	On 1 t of farina	0.3	10	0.3	10	
Bran	On 10 t of bran	0.3	6	0.3	6	
Feed tailings	On 100 t of grain	0.5	6	0.5	6	

Remark: All magnets for cleaning the products are set up in double protection with stationary magnets. The second protection could be installed using single horse-shoe magnets.

II. INSTALLATION OF MAGNETIC PROTECTION

1. All magnets must be installed in places with easy access to them. Magnets should not be placed where they will be exposed to vibration or jerking.
2. Magnets must be installed in places where it is possible to shut off the stream of product for cleaning, or a separate stream may be installed with magnets.
3. The magnetic protection must be installed so that, during cleaning, the metal parts will not fall into the product.
4. The minimum slopes acceptable for self-cleaning chutes are: for grain 25-30°, for products from scouring and break process 45-50°, for flour 50-55°, and bran 55-60°.
5. The product passing over magnetic protection devices must be evenly distributed in a layer of not more than 5 mm thickness. The speed of the grain and ground products passing over the magnets should be at a minimum. When using a wider magnetic protection device than 0.5 m, the product must be distributed with a moving mm wire or roll.
6. It is prohibited to install in the same chute magnetic horse shoes one against the other.
7. When putting together the magnetic apparatus from single horse shoes, the matching poles must be together. Material of non-magnetic nature must be placed between the magnets.
8. When magnets are installed from the top of the chute, the poles of magnetic shoes must be 5-10 mm from the bottom. The horse shoes are installed in checkerboard pattern.
9. Magnets in chutes must be installed in two consecutive groups and not less than four in each group.
10. It is prohibited to pound on chutes with magnet installation.
11. When electromagnets are installed, an electrical device must also be installed which shows when the magnet is energized. Electromagnets are installed only in

double protection (one electromagnetic and one stationary).

12. A journal must be set up, corresponding with the orders from head of techno-chemical control, for the number of magnets installed and their proper maintenance.

13. The proper functioning of magnets must be checked daily, and thoroughly every 10th day of operation, with control checking once a month from techno-chemical personnel.

14. The load capacity of every horseshoe (separately or in apparatus) is 12 kg.

15. Before starting up the operation, after ~~in~~ ten 24-hour periods of down time, the magnets must be rechecked.

16. For more down time than ten days and nights, the magnets must be bridged with a piece of iron.

17. The magnets are checked according to schedule. Four or five control magnets for final product are installed in a chute which has a padlock or key. The checking is done 2-3 times a shift by the shift foreman, senior magnet man and on-duty technician.

18. The metal collected from magnets is placed in a box and kept under padlock or key.

19. The box containing the metal is submitted to the director.

20. The rules and schedules for hourly cleaning of magnets and inspection every ten days and nights is set up by the head engineer.

Appendix 3

Approved with Order of Ministry of Bread Products of USSR

No. 306 June 28, 1958

The order for interstate (minimum) conditions of grain, to be transported by order of inter-republic industries to beused for manufacturing of flour, grits and foods.

1. For Flour Production

Every load of grain to be transferred (by carload, truck, boat) must be of at least the quality conditions a listed, namely:

A. [redacted] conditions for all cultures

1. With normal odor and taste.
2. With infestation of mites not higher than 2nd degree. Grain infested with granary weevil first degree or other warehouse infestation (besides the mites), may be transported only when the grain is worked over according to special instructions from Ministry of Bread Products of USSR.
3. Every shipment must be of the same type.

B. Illustration for Separate Cultures

(Not More)

Quality Illustration	Cultures: Wheat	Rye
Moisture in %	15.5	15.5
Sand premixed in %	2.0	2.0
In that amount:		
1) All kinds of mineral impurities	0.3	0.3
In that amount of mineral impurities:		
a) pebble	0.10	0.10
b) slag and ore	0.05	0.05
2) Pernicious impurities:	0.2	0.2
In that amount of pernicious impurities:		
a) water-pepper, mustard (separately or combined)	0.10	0.10
b) ergot (separately or combined)	0.15	0.15
3) Cockle	0.5	0.5
Grain impurities in %	5.0	4.0
In that amount germinated grain:	3.0	3.0
Bran:		
Quantity in % (not less):		
by graded grinding	25.0	--
by both grindings	20.0	--
quality (not lower)	2nd group	--

B. Separate Requirements and Conditions

1. Moisture

a) In warehouses having a grain washing machine, but not a drying installation, the shipment of wheat is permitted with moisture not exceeding 13.5% in quantities as ordered by receiver.

b) In warehouses having drying installations, the grain could be prepared before shipment according to the specifications given by the receiver. The remaining grain could be redried and returned to the warehouse.

2. Weed Seed Impurities

Grain which contains mineral impurities over 0.2%, or pernicious 0.05% to 0.2% (in that amount mustard, ergot 0.04% to 0.1%) which could not be separated with ordinary cleaning procedure, must be stored separately for later special cleaning.

In the districts where there are no mills with grain washing machines, wheat containing more than 10% impurities or discoloration, could be shipped to the fully equipped mills with special permission from Ministry and all ministries concerned, and should have an acceptance order from the mill receiver.

3. Grain Infested with Bugs, Worms

The acceptance of infested wheat in mills is allowed only with special permission each time from Ministry of Bread Products of USSR.

In interstate movement of grain, the orders f must be followed for grain and flour from Ministry of Bread Products USSR and for each state, but the quantities and qualities must correspond with standard and technical instructions.

Appendix 4

Technical Norms for Production Equipment in the Mill

Kind of Grinding	kg. of grain on 1 cm. on length of mill			kg. of grain on 1 cm² sifter surface in 24 hr. period			Required HP on 1 ton of grain to be ground in 24 hours (by mechanical conveying)		
	for mills in respect to I grade	for mills in resp. to II gr.	for mills in respect to III gr.	for mills in resp. to I gr.	for mills in respect to II gr.	for mills in respect to III gr.	for mills in respect to II gr.	for mills in respect to III gr.	for mills in respect to III gr.
Many graded grinding of wheat	85	80	75	800	725	630	2.5	2.7	2.75
One graded 85% extr. of wheat	125	95	95	1390	960	830	2.3	2.4	2.5
Both grindings of wheat	330	330	330	3750	3750	3750	1.15	1.15	1.15
One grade 63% of rye	70	70	70	590	590	590	2.5	2.5	2.5
Two graded 15 + 63% gr. of rye	140	140	140	1310	1310	1310	2.0	2.0	2.0
87% grinding of rye	170	170	170	1500	1500	1500	2.0	2.0	2.0
Grinding of rye	295	295	295	3360	3360	3360	1.3	1.3	1.3

Remark:

1) The average calculation for the amount of sifters needed in the mills conducting graded grinding is 200-300 kg. of grain in a 24 hr. period on 1 cm width of screen in all sifters. For manufacturing the flour of finest quality and for macaroni flour from hard wheat - 150-200 kg. of grain in a 24 hr. period on 1 cm width of screen in all sifters. For one grade 85% grinding of wheat the number of sifters is calculated with 600 kg. grain on 1 cm. width of screen in sifter.

2) The norms for the mills grinding wheat and rye are set for rolls with diameter 250 mm. In the cases where the mill uses rolls with diameter 300-350 mm, the load increases 10% on every 50 mm of increased diameter of rolls.

Appendix 1

Scheme for Three-Graded 78% Extr., Two-graded 70% Extr., and One-Graded 72% Extr. of Wheat by Setting up the Process on Three Technological Lines

System	Length of Rolls in % by Groups: Break, Sizing and Grinding Systems	No. of Corrugations on 1 cm of Circumference	Slope of Corrugations in %	Sifting Surface in % by groups: Break, Sizing and Grinding Systems
1st technological line - break process				
I break	10-13	4-5	4-6	7-9
II	20-26	5-5, 5-6.5	6-8	12-16
III	18-22	5-5, 5-6.5	6-8	12-14
IV	14-18	6.5-7	8-10	8-12
V	12-14	7.8	8-10	6-8
VI	9-11	9.0	10	4-6
VII	5-8	9.5	10	3-4
1st sortation	--	--	--	3-4
2nd	--	--	--	5-9
3rd	--	--	--	5-7
4th	--	--	--	5-7
5th	--	--	--	3-4
Resifting for tailings and overs	--	--	--	3-4
Propeller (hammer), brush machine & centrifuges	--	--	--	9-11
TOTAL	100	--	--	100
2nd technological line - sizing process (middlings)				
1st middlings	10-12	9.5	6-8	10-12
2nd	16-18	9.5	6-8	18-20
3rd	12-16	10.0	6-8	10-14
4th	10-12	10.0	6-8	10-12
5th middlings (for tailings)	10-12	9.5	6-8	10-12
6th "	8-10	10.0	8-10	8-10
7th " (grinding of tailings)	8-10	10.0	8-10	8-10
8th " "	8-10	10.0	8-10	8-10
9th "	8-10	10.0	8-10	8010
TOTAL MIDDLINGS	100	--	--	100
3rd technological line - grinding process				
1st grinding	18-20	10-11	8-10	11-14
2nd	16-19	10-11	8-10	11-14
3rd	13-15	10-11	8-10	9-11
4th	10-13	10-11	8-10	9-11
5th	6-8	10-11	8-10	9-11
6th	6-8	10-11	8-10	5-7
7th	6-8	10-11	8-10	4-6
8th	6-8	10-11	8-10	4-6
9th	4-6	10-11	8-10	4-6
10th	4-6	10-11	8-10	4-6
Resifting of tailings and overs	--	--	--	9-11
Brush machine and centrifuges	--	--	--	9-11
TOTAL	100	--	--	100
Control flour highest grade	--	--	--	15-25
Control flour first grade	--	--	--	35-55
Control flour 2nd grade	--	--	--	30-40
TOTAL	--	--	--	100

Appendix 6

Scheme for Three-graded 78% Extr. and One-Graded 72% Extr. of Wheat by Setting up the Process on Two Techlological Lines

	Length of Rolls in % by groups of break and grinding systems	No.of Corrugations on 1 cm Circumference of rolls	Slope of Corrugations in %	Sifting Surface in % by Groups: Break & Grinding Systems
Break	**1st technological line - break process**			
I break	12-14	4-5	4-6	9-10
II	22-26	5.5-6-7	6-8	13-18
III	20-24	6-7.5	6-8	13-15
IV	17-20	6.5-7-8	8-10	9-13
V	12-17	7-8-9	8-10	8-10
VI	6-10	8-9-9.5	10	5-8
1st sertation	--	--	--	4-5
2nd	--	--	--	5-8
3rd	--	-	--	4-5
4th	--	--	--	4-5
Propeller, brush machine and centrifuge	--	--	--	13-16
TOTAL	100	--	--	100
	2nd technological line - grinding prdcess			
1st sizing	6-8	9	6-8	7-9
2nd	6-8	10	6-8	4-6
3rd	5-7	10	6-8	4-6
1st grinding	10-14	10-11	8-10	8-11
2nd	10-12	10-11	8-10	8-11
3rd	8-10	10-11	8-10	7-9
4th	6-8	10-11	8-10	5-7
5th	6-8	10-11	8-10	5-7
6th	6-8	10-11	8-10	5-8
7th	5-7	10-11	8-10	4-6
8th	4-5	10-11	8-10	4-6
9th	3-5	10-11	8-10	3-5
10th	3-5	10-11	8-10	3-5
1st sailings	4-5	9.5	8	4-6
2nd	3-5	10	8	3-5
Sertation or seperation	--	--	--	3-5
Brush machine & centrifuges	--	--	--	5-7
TOTAL	100	--	--	100
Centrol flour highest grade	--	--	--	15-25
Centrol flour first grade	--	--	--	35-55
Centrol flour 2nd grade	--	--	--	30-40
TOTAL	--	--	--	100

Appendix

For Two-Grade Extraction of Wheat

	Length of Rolls in % by groups of break and grinding systems	No. of Corrugations on 1 cm Circumference of rolls	Slope of Corrugations in %	Sifting Surface in % by Groups: Break and Grinding Systems
Break Process				
I Break	12-14	4-5	4-6	12-14
II Break	18-22	5-5.5	6-8	12-14
Overs	12-14	7-7.5	6-8	6-7
III Break	16-19	6-6.5	6-8	12-14
IV Break	16-19	7-8	8-10	12-14
V Break	9-12	8.5-9.0	8-10	6-7
VI Break	7-10	9	10	6-7
1st Separation	--	--	--	6-7
2nd	--	--	--	6-7
3rd	--	--	--	6-7
Propeller, brush machine & resifting of overs from sizing	--	--	--	6-9
TOTAL	100	--	--	100
Grinding Process				
1st Sizing	6-8	9-9.5	6-8	5-8
2nd sizing	6-8	9.5-10	6-8	5-8
1st grinding	8-14	10	8-10	8-12
2nd	8-14	10.5	8-10	7-12
3rd	8-10	10.5	8-10	7-10
4th	8-10	10.5	8-10	7-10
5th	6-8	10.5	8-10	5-8
6th	6-8	10.5	8-10	5-8
7th	6-8	10.5	8-10	5-8
8th	6-8	10.5	8-10	5-8
9th	5-6	10.5	8-10	5-6
1st tailings	6-8	10	8-10	5-8
2nd tailings	5-6	10	8-10	5-6
Brush machine and resifting of pieces through brush machine	--	--	--	6-9
TOTAL	100	--	--	100
Control flour 1st gr.	--	--	--	50-65
Control flour 2nd gr.	--	--	--	35-50
TOTAL	--	--	--	100

Appendix 8

Orientation Illustration for Extraction of Grits, Dunstan and Flour by Many Graded Grinding and One-Grade 72% Extr. of Wheat in First Break Systems

Name of System	Grits of 3 Kinds			Grit-Dunst Products				Total Extr. in % from the Weight of the Prod. Entering 1st Br. System
	Coarse %	Middle %	Fine %	Total Grits %	Dunst %	Total %	Flour %	
I. Wheat - Vitreousness Higher Than 60%								
I Break	5.5	1.5	1.0	8.0	1.0	9.0	1.0	10.0
II	23.5	6.0	4.0	33.5	4.5	38.0	4.0	42.0
III	6.0	4.5	3.0	13.5	3.5	17.0	3.0	20.0
Total Grits & Dunsts 1st Qual. & Flour	35.0	12.0	8.0	55.0	9.0	64.0	8.0	72.0
IV Br. System, Grits 2nd Qual. & Flour	--	2.5	2.0	4.5	2.5	7.0	2.0	9.0
II. Wheat - Vitreousness 40-60%								
I Break	5.0	1.5	1.0	7.5	1.5	9.0	1.0	10.0
II	20.0	6.5	4.5	31.0	5.0	36.0	5.0	41.0
III	5.5	4.0	3.0	12.5	3.5	16.0	3.0	19.0
Total grits & dunsts 1st Qual. & Flour	30.5	12.0	8.5	51.0	10.0	61.0	9.0	70.0
IV Break System, Grits 2nd Qual. & Flour	--	1.5	2.5	4.0	3.0	7.0	3.0	10.0
III. Wheat - Vitreousness Less Than 40%								
I Break	4.5	1.5	1.0	7.0	1.5	8.5	1.5	10.0
II	15.0	1.0	4.5	26.5	6.0	32.5	5.5	39.0
III	3.0	4.5	4.0	11.5	3.5	15.0	4.0	19.0
Total Grits & Dunsts 1st Qual. & Flour	22.5	13.0	9.5	45.0	11.0	46.0	11.0	67.0
IV Break System, Grits 2nd Qual. & Flour	--	--	3.0	3.0	3.5	6.5	4.0	10.5
IV. Hard Wheat								
I Break	6.5	1.5	1.0	9.0	0.5	9.5	0.5	10.0
II	25.5	7.5	5.0	38.0	2.5	40.5	1.5	42.0
III	8.5	5.0	3.5	17.0	2.0	19.0	1.0	20.0
Total Grits & Dunsts 1st Qual. & Flour	40.5	14.0	9.5	64.0	5.0	69.0	3.0	72.0
IV Break System, Grits 2nd Qual. & Flour	--	3.0	2.5	5.5	2.0	7.5	1.5	9.0

Remark: 1) For wheat with lower vitreousness it is recommended to obtain the best extraction but only in smaller numbers (below 70%) as is illustrated in the tables.
2) For better extraction in these cases, it is recommended after roll grinding to utilize the end products using brush machines and propeller(hammer) machines.
3) The illustrations for extractions are given without the returned material from break and sifting and sizing systems.

Appendix 9

Orientation for Balance in Process of Sizing and Sifting of Grits and Hard Dunsts by Graded Grinding of Wheat (Vitreousness 40-60%)

Products	Enter Sifting in % of Product Wt. Entering I Break System	Enter Sifting in % of Product Weight Entering I Break System					
		Grits					
		From Sizing	Farina	Grinding	Total Grits	Overs	Tailings
A. Grits and Dunsts 1st Quality							
Grits Coarse from 1st and 2nd Break Systems	25.0	17.0	2.0	1.5	20.5	3.5	1.0
Grits Coarse from III Break System	5.5	4.0	--	--	4.0	1.0	0.5
Grits Middle and Fine From I, II and III Break Systems	20.5	8.5	--	10.0	18.5	1.5	0.5
Dunsts Hard from I, II and III Break Systems	6.0	--	--	5.5	5.5	0.5	--
TOTAL	57.0	29.5	2.0	17.0	48.5	6.5	2.0
Grits 1st Quality from Sizing System	21.0	1.5*	--	17.5	1910	1.5	0.5
* 1.5% grits of 2nd quality.							
B. Grits and Dunsts 2nd Quality							
Grits from IV Break System Grits after Resifting Tailings from Sifters	4.0 1.5	2.5	--	1.5	4.0	1.0	0.5
Overs from Sifters	8.0	4.0	--	1.5	5.5	1.5	1.0
TOTAL	13.5	6.5	--	3.0	9.5	2.5	1.5
Grits 2nd Quality from Sizing System	6.0	--	--	4.0	4.0	1.5	0.5

Appendix 10

Orientation Table for Flour Extraction in Systems by Three Graded Grinding of Wheat

Name of System	% Extraction of Flour in Systems	
	Two Lines	Three Lines
1st sortation from I break	1.5	1.5
2nd sortation from II break	5.5	5.5
3rd sortation from III break	4.0	4.0
4th sortation from IV break	3.6	3.4
V break	2.0	1.85
VI break	1.25	1.0
VII break	--	0.6
Resifting of overs	0.3	0.3
Resifting of tailings	0.9	0.9
Resifting of overs thru screens of propeller and brush machines	2.2	2.2
TOTAL	21.25	21.25
1st sizing	3.0	--
2nd sizing	3.0	--
3rd sizing	2.0	--
1st sizing	--	1.5
2nd sizing	--	2.7
3rd	--	2.5
4th	--	1.8
5th	--	1.5
6th	--	1.0
7th	--	1.0
8th	--	1.0
9th	--	0.5
TOTAL	8.0	13.5
1st grinding	10.0	10.0
2nd	10.0	10.0
3rd	8.35	7.35
4th	6.0	5.5
5th	4.5	4.5
6th	2.8	2.8
7th	2.5	2.2
8th	2.0	1.5
9th	1.5	1.2
10th	1.0q	--
1st overs	1.5	--
2nd overs	1.0	--
Overs at sortation	--	--
Resifting tailings from sifters	0.4	1.0
Resifting passes thru screens of brush machine	0.7	0.7
TOTAL	52.25	46.75
Total on sizing and grinding lines	60.25	60.25
Total on control systems	[illegible]	[illegible]
Overs in control systems	[illegible]	1.5
Flour for distribution	78.0	78.0

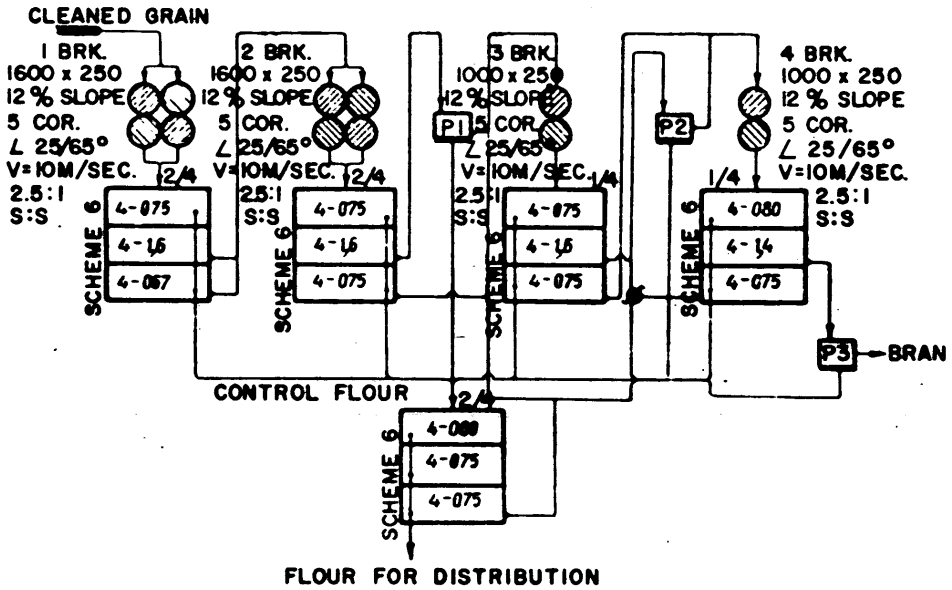
Appendix 11

Orientation Table for 78% Two Graded flour Extraction From Wheat in the Systems

Name of the System	Quantity of Flour in %
1st sortation (from I break and scouring)	3.5
2nd sortation (from II break)	5.0
3rd sortation (from III break(	4.0
IV break	4.0
V break	2.8
VI break	1.5
Resifting passes thru screens of propeller & brush machines	2.2
TOTAL	23.0
1st sizing	3.0
2nd sizing	3.0
1st grinding	9.0
2nd grinding	9.0
3rd grinding	7.5
1st overs	3.0
4th grinding	5.5
5th grinding	4.8
6th grinding	5.0
2nd overs	2.0
7th grinding	2.5
8th grinding	2.0
9th grinding	1.5
Resifting passes thru screens of brush machine	0.7
TOTAL	58.5
Total to Control	81.5
Overs at Control	3.5
Flour for Distribution	78.0

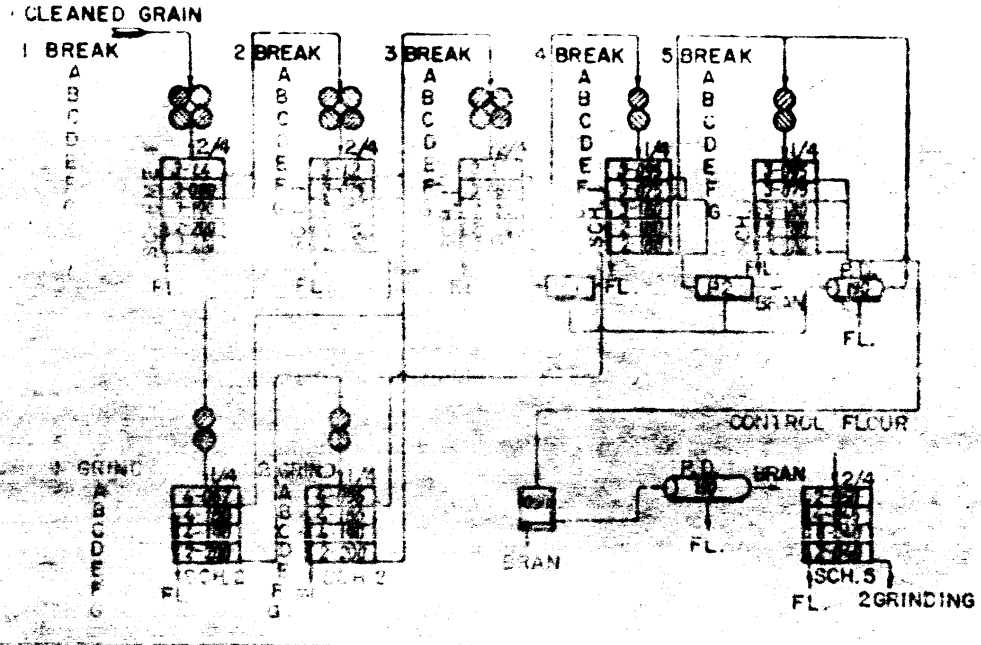
APPENDIX 22

SAMPLE SCHEME FOR GRINDING WHEAT AND RYE
MILL CAPACITY- 150 TONS PER 24 HRS.



APPENDIX 23

SAMPLE SCHEME FOR 87% RYE EXTRACTION
MILL CAPACITY- 135 TONS PER 24 HOURS

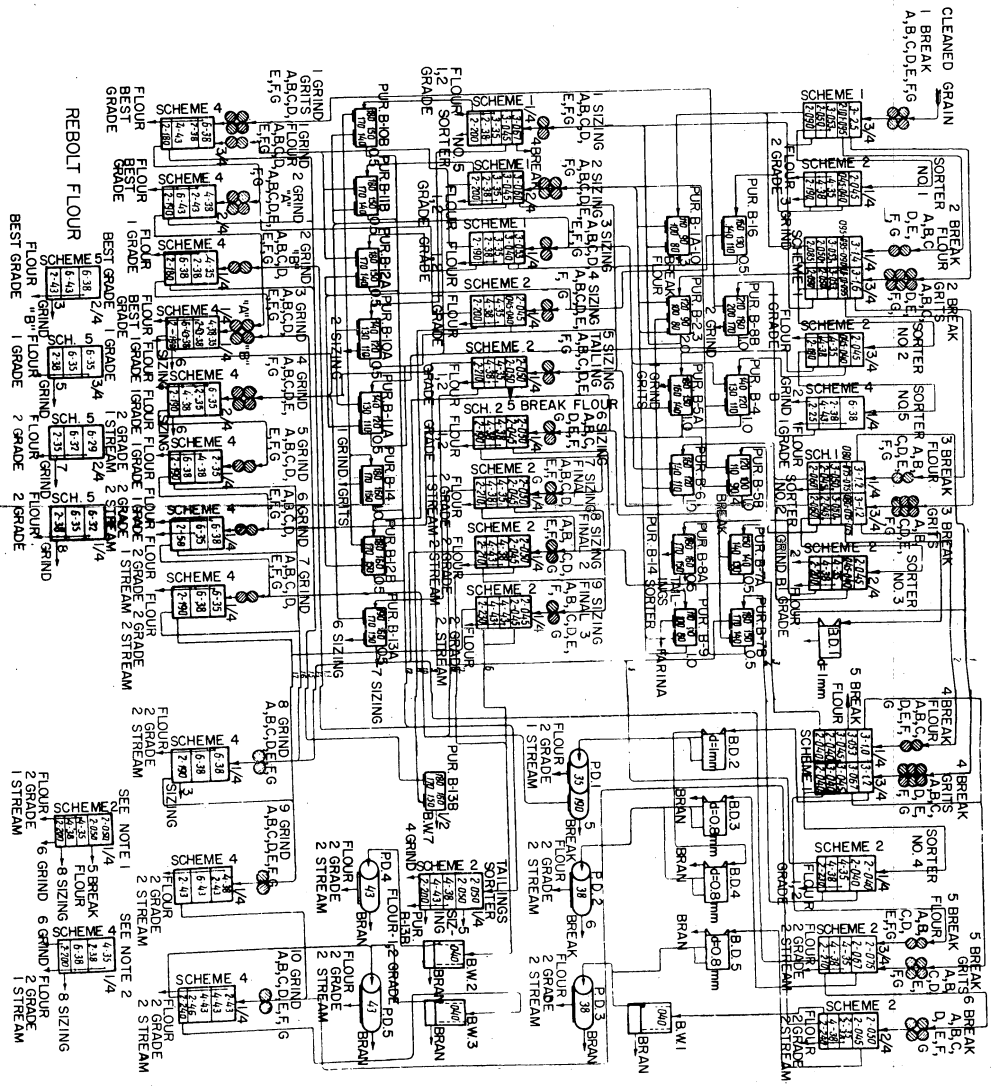


	1 BREAK	2 BREAK	3 BREAK	4 BREAK	5 BREAK	1,2 GRIND
A-LENGTH X DIAMETER, MM	1500 X 250	1600 X 250	1600 X 250	1600 X 250	800 X 250	800 X 250
B-SPIRAL, % SLOPE	10%	10%	12%	12%	12%	10%
C-CORRUGATIONS PER CM	5.5	6	7	8	9	9
D-PROFILE ANGLES	25/65°	25/65°	25/65°	25/65°	25/65°	25/65°
E-PERIPHERAL SPEED, M/SEC	8	8	6	6	6	8
F-ROLL DIFFERENTIAL, RATIO	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1
G-PRESENTATION	S:S	S:S	S:S	S:S	S:S	S:S

FL. -FLOUR
P.D. -PROPELLER TYPE DUSTER
P1;P2- PURIFIER

APPENDIX 30

SAMPLE SCHEME FOR 78% THREE GRADED WHEAT EXTRACTION MILL CAPACITY– 320 TONS PER 24 HOURS.

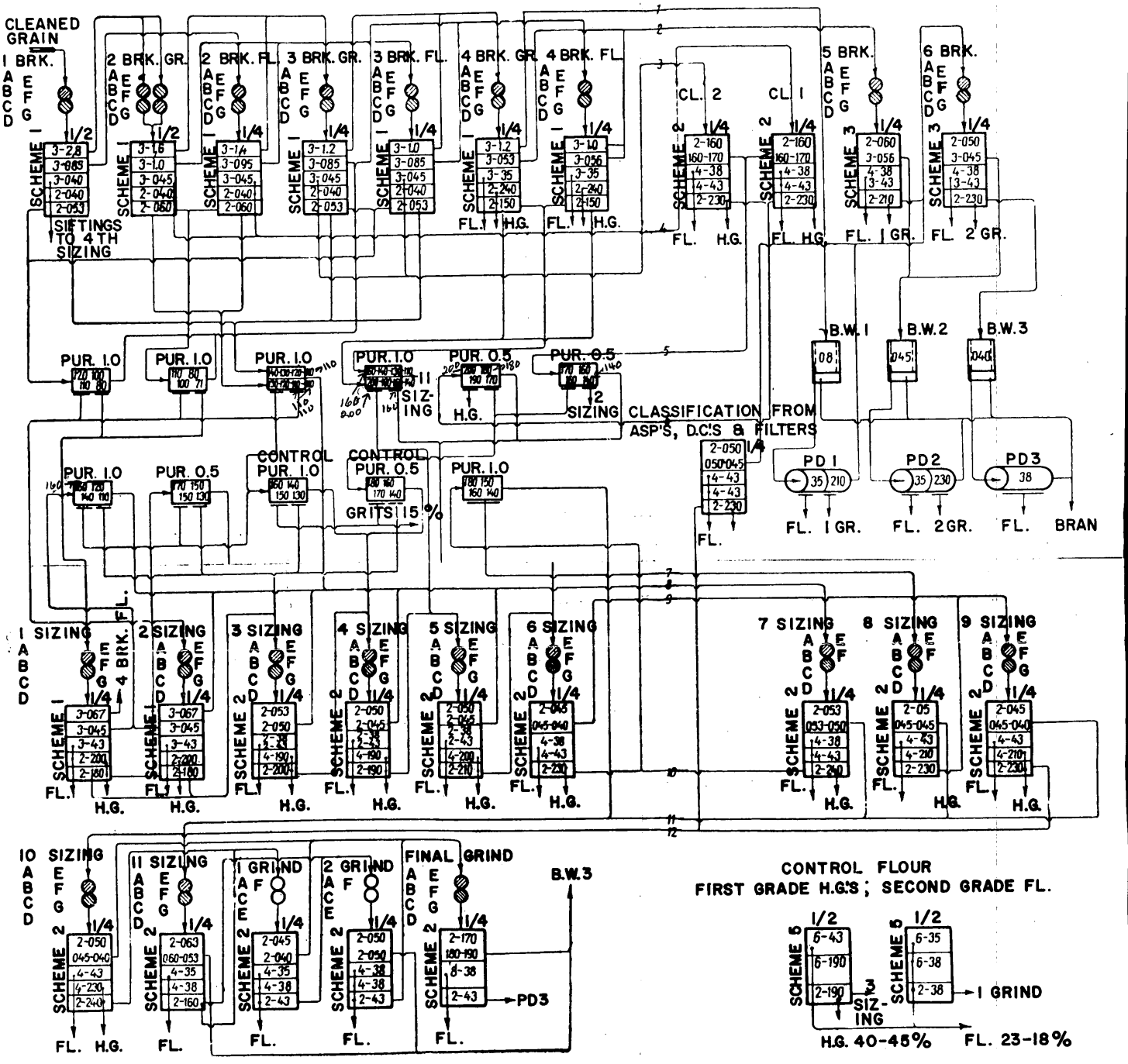


	A	B	C	D	E	F	G
1 Break	2000 x 250	6%	4.5	35/60°	6	2.5:1	D.D
2 Break Flour	1000 x 250	6%	6.5	35/60°	6	2.5:1	S.S
2 Break Grits	3000 x 250	-	5	-	-	-	-
3 Break Flour	1000 x 250	6%	7.5	35/60°	6	2.5:1	S.S
3 Break Grits	3000 x 250	-	6	-	-	-	-
4 Break Flour	1000 x 250	8%	8	35/65°	6	2.5:1	S.S
4 Break Grits	2000 x 250	10%	6.5	-	-	-	-
5 Break Flour	1000 x 250	10%	8	35/65°	6	2.5:1	D.D
5 Break Grits	1600 x 250	-	8	-	-	-	-
6 Break	1600 x 250	10%	9	35/65°	6	2.5:1	D.D
1 Sizing	1000 x 250	6%	9	35/65°	6	1.5:1	S.S
2 Sizing	800 x 250	8%	9.5	35/65°	6	1.5:1	S.S
3 Sizing	1000 x 250	8%	9.5-10	35/65°	6	1.5:1	S.S
4 Sizing	1000 x 250	8%	10	35/65°	6	1.5:1	D.D
5 Sizing Tailing	1000 x 250	8%	9.5	35/65°	6	1.5:1	D.D
6, 7, 8, 9 Sizing	800 x 250	10%	10	35/65°	6	1.5:1	D.D
1 Grind Grits, 3 Grind "A" "B"	2000 x 250	8%	10	40/70°	6	1.5:1	D.D
1 Grind Flour	800 x 250	-	-	-	-	-	D.D
2 Grind "A"	2000 x 250	8%	10.5	40/70°	6		D.D
2 Grind "B"	800 x 250	8%	10.5	40/70°	6-8	1.5:1	D.D
4 Grind	1600 x 250	8%	10.5-11	40/70°	6	1.5:1	D.D
5, 6, 7, 8 Grind	1000 x 250	8%	10.5-11	40/70°	6	1.5:1	D.D
9, 10 Grind	800 x 250	8%	10.5-11	40/70°	6	1.5:1	D.D

Refer to Appendix 26 for Reference to
A, B, C, D, E, F, G.

PUR. - Purifier
B.D.1, B.D.2, B.D.3, B.D.4, B.D.5, - Bran Duster
B.W.1, B.W.2, B.W.3, - Brush Machine
P.D.1, P.D.2, P.D.3, P.D.4, P.D.5, - Centrifuge

SAMPLE SCHEME OF A SPECIAL GRINDING OF HARD WHEAT FOR THE MACARONI INDUSTRY



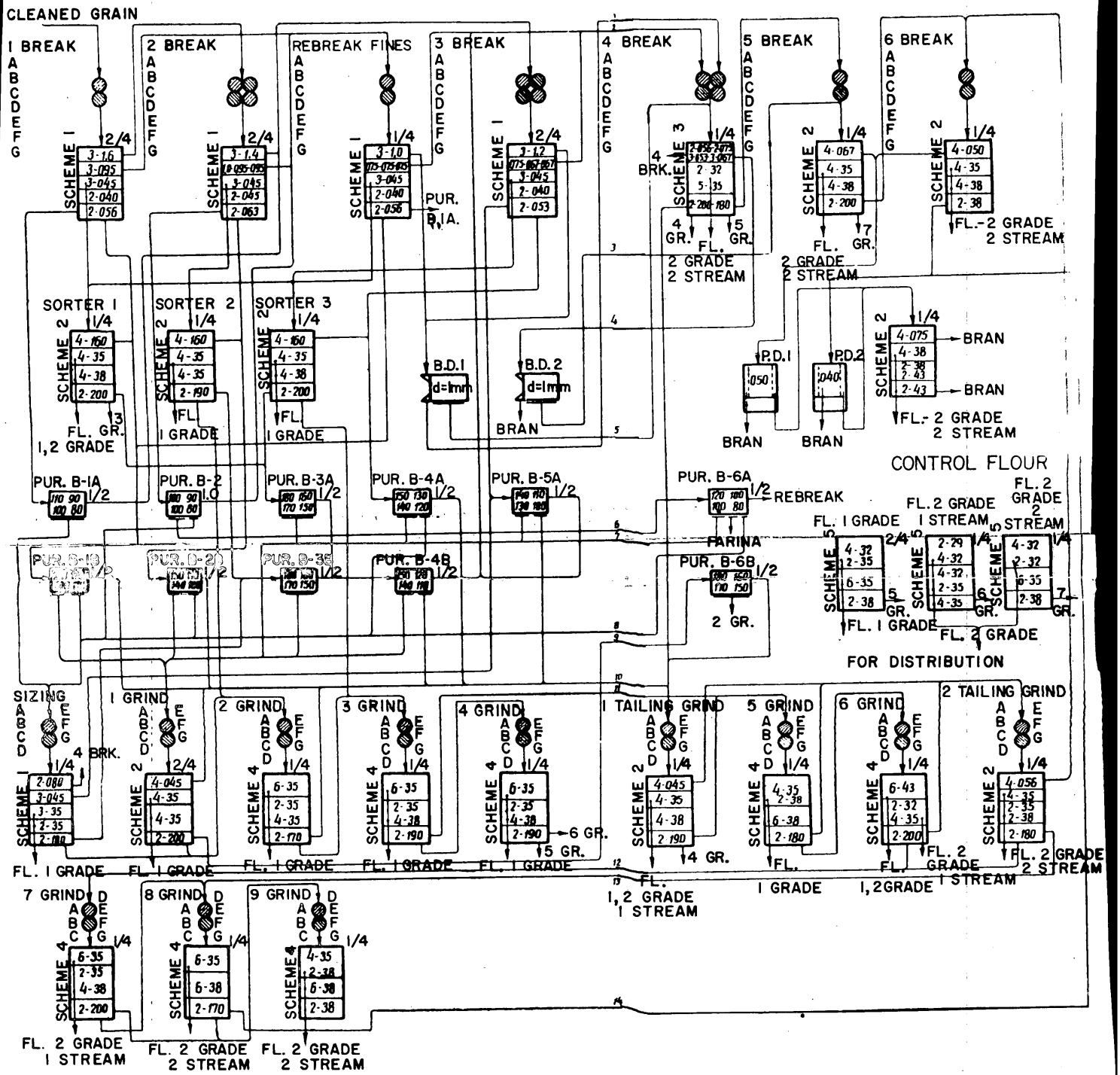
		A	B	C	D	E	F	G
1	1 Brk.	1000 x 250	4%	4	20/70	6	2.5:1	D.D
2	2 Brk. Gr.	1600 x 250	4%	5	35/60	6	2.5:1	D.D
3	2 Brk. Fl.	800 x 250	"	6.5	"	"	"	"
4	3 Brk. Gr.	1000 x 250	"	6	"	"	"	"
5	3 Brk. Fl.	800 x 250	"	7	"	"	"	"
6	4 Brk. Gr.	1000 x 250	6%	7	"	"	"	"
7	4 Brk. Fl.	800 x 250	"	8	20/70	"	"	"
8	5 Brk.	1000 x 250	"	"	"	"	"	"
9	6 Brk.	800 x 250	"	9	"	"	"	"
10	1 Sizing	" "	8%	9.5	35/60	"	2	"
11	2 Sizing	" "	"	10	"	"	"	"
12	3-11 Sizing	" "	"	11	35/65	"	1.5:1	"
13	1-2 Grind	" "	-	Smooth	-	"	"	-
14	Final	" "	"	"	20/70	"	"	"

Refer to Appendix 26 for reference to A, B, C, D, E, F, G.

GR. - Grits
H.G. - Half Grits
FL. - Flour
BW1, BW2, BW3, Brush Machine
CL1, CL2, Classifier
ASP., Aspirator
DC, Dust Collector
PD1, PD2, PD3, Centrifuge

APPENDIX 28

SAMPLE SCHEME FOR 78% - TWO GRADED WHEAT EXTRACTION
MILL CAPACITY - 150 TONS PER 24 HOURS



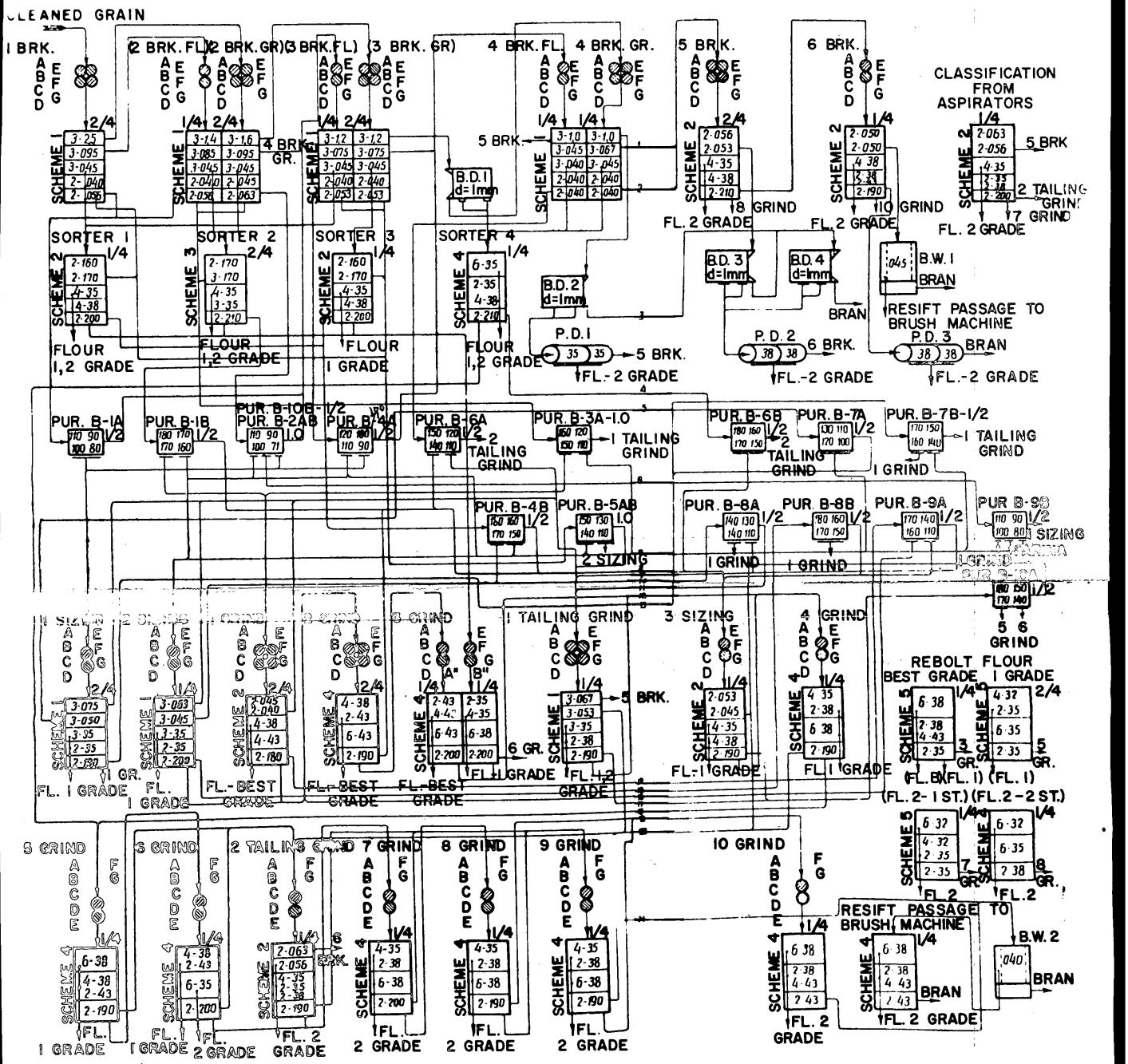
	A	B	C	D	E	F	G
1st Break	1000 x 250	6%	4-5	35/60°	6	2.5:1	S.S
2nd Break	1600 x 250	8%	5-5.5	25/60°	"	"	"
Rebreak Fines	1000 x 250	"	7-7.5	25/65°	"	"	"
3rd Break	1600 x 250	6%	6-6.5	"	"	"	"
4th Break	"	8%	7-8	35/65°	"	"	D.D
5th Break	800 x 250	6%	8.5	"	"	"	"
6th Break	"	10%	9	"	"	"	"
Sizing	"	6%	9-9.5	"	"	1.5:1	S.S
1st Grind	1000 x 250	8%	10	"	"	"	"
2, 3, 4 Grind	"	"	10.5	40/70°	"	"	"
1, 2 Tailing Grind	800 x 250	"	10	35/65°	"	"	D.D
5th Grind	"	6%	10.5	40/70°	"	"	S.S
6th Grind	"	8%	"	"	"	"	"
7, 8, 9 Grind	"	"	10.5	"	"	"	"

Refer to Appendix 26 for reference to A, B, C, D, E, F, G.

PUR. - Purifier
GR. - Grind
FL. - Flour
B.D. , B.D.2 - Bran Duster
P.D.1, P.D.2 - Centrifuge

APPENDIX 29

SAMPLE SCHEME FOR 78 % - THREE GRADED WHEAT EXTRACTION MILL CAPACITY - 240 TONS PER 24 HOURS.



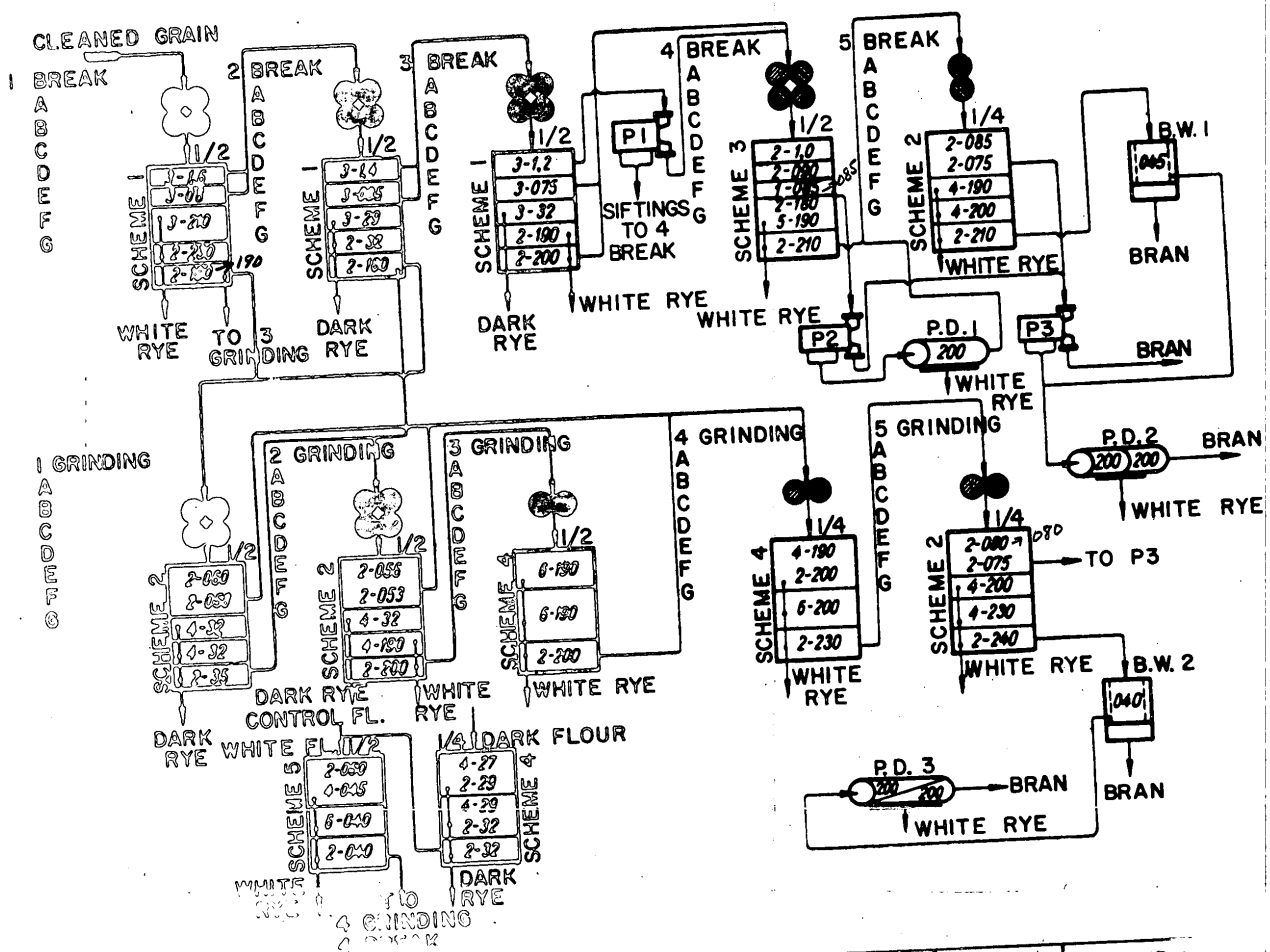
	A	B	C	D	E	F	G
1st Break	1600 x 250	6%	4	35/60°	6	2.5:1	D.D
2nd Break Flour	800 x 250	6%	6.5-7.0	35/60°	6	2.5:1	S.S
2nd Break Grits	2000 x 250	8%	5	35/60°	6	2.5:1	S.S
3rd Break Flour	800 x 250	6%	7.5	35/60°	6	2.5:1	S.S
3rd Break Grits	2000 x 250	6%	6	35/60°	6	2.5:1	S.S
4th Break Flour	800 x 250	8%	8	35/65°	6	2.5:1	S.S
4th Break Grits	1600 x 250	10%	7	35/65°	6	2.5:1	S.S
5th Break	1600 x 250	10%	8	35/65°	6	2.5:1	S.S
6th Break	800 x 250	18%	9	35/65°	6	2.5:1	S.S
1st Sizing	1000 x 250	6%	9	35/65°	6	1.5:1	S.S
2nd Sizing	1000 x 250	6%	10	35/65°	6	1.5:1	S.S
1st Grind	1800 x 250	8%	10	40/70°	6	1.5:1	D.D
2nd, 3rd Grind	1600 x 250	8%	10	40/70°	6-8	1.5:1	D.D
1st Tailing Grind	800 x 250	8%	9.5	35/65°	6	1.5:1	D.D
3rd Sizing, 2nd Tailing Grind	800 x 250	8%	10	35/65°	6	1.5:1	D.D
4th, 5th, 6th, 7th Grind	1000 x 250	8%	10.5	40/70°	6	1.5:1	D.D
8th, 9th, 10th Grind	800 x 250	8%	10.5	40/70°	6	1.5:1	D.D

Refer to Appendix 26 for Reference to A, B, C, D, E, F, G.

BRK. - Break
FL. - Flour
GR. - Grits
B.D.1, B.D.2, B.D.3, B.D.4 - Bran Duster
P.D.1, P.D.2, P.D.3 - Centrifuge
B.W.1, B.W.2 - Brush Machine
PUR. - Purifier
(FL.B) - Best Grade Flour
(FL.1) - 1st Grade Flour
(FL.2 - 1st) - 2nd Grade Flour - 1st Stream
(FL.2 - 2st) - 2nd Grade Flour - 2nd Stream
(FL.2) - 2nd Grade Flour

APPENDIX 24

SAMPLE SCHEME FOR TWO GRADED (15 + 65%) GRINDING OF RYE
MILL CAPACITY — 200 TONS PER 24 HOURS

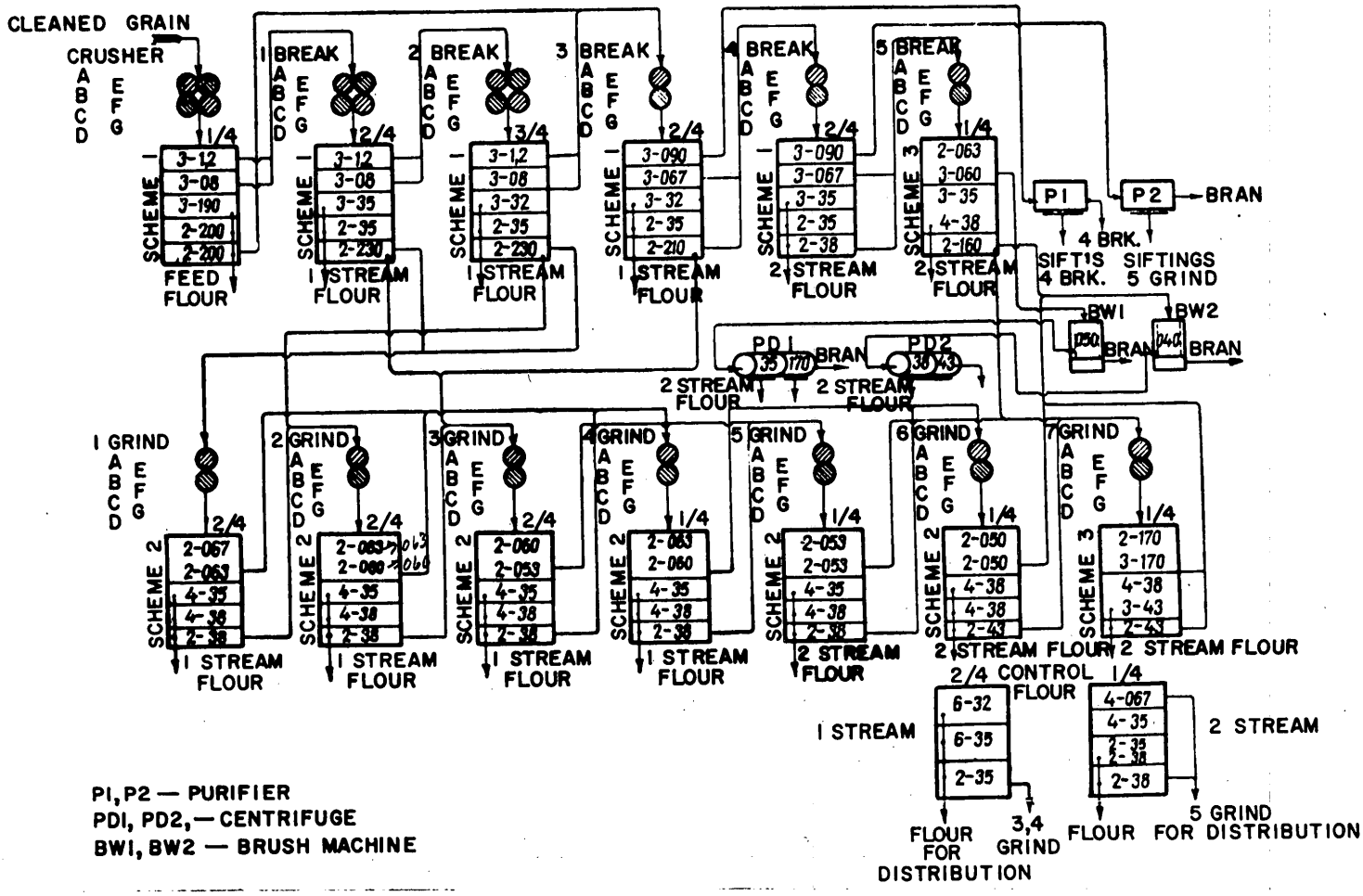


	1 BREAK	2 BREAK	3 BREAK	4 BREAK	5 BREAK	1 GRIND	2 GRIND	3,4 GRIND	5 GRIND
A-LENGTH X DIAMETER, MM	1600X250	2000X250	2000X250	1600X250	1600X250	2000X250	1600X250	1000X250	800X250
B-SPIRAL, % SLOPE	8%	8%	10%	12%	12%	10%	12%	12%	12%
C-CORRUGATIONS PER CM	5	5.5	6.5	8	9	9.5	10	10	10
D-PROFILE ANGLES	25/65	25/65	25/65	25/65	25/65	25/65	25/65	25/65	25/65
E-PERIPHERAL SPEED, M/SEC	6	6	6	6	6	6	6	6	6
F-ROLL DIFFERENTIAL, RATIO	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1
G-PRESENTATION	S:S	S:S	S:S	S:S	D:D	D:D	D:D	D:D	D:D

P1, P2, P3 — PURIFIER
PD1, PD2, PD3 — CENTRIFUGE
BW1, BW2, — BRUSH MACHINE

APPENDIX 25

SAMPLE SCHEME FOR 63% RYE EXTRACTION
MILL OAPACITY – 100 TONS PER 24 HOURS

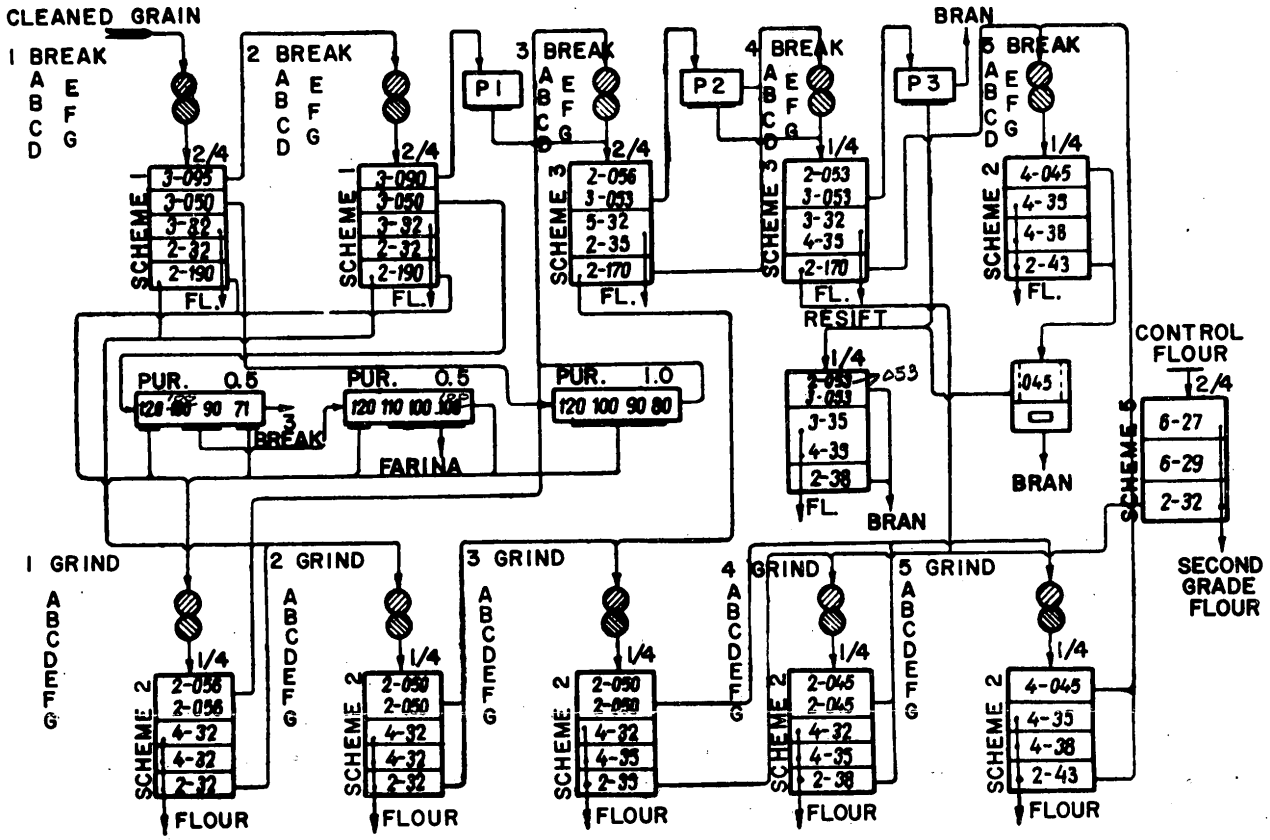


P1, P2 — PURIFIER
PD1, PD2, — CENTRIFUGE
BW1, BW2 — BRUSH MACHINE

	CRUSHER	1 BREAK	2 BREAK	3 BREAK	4 BREAK	5 BREAK	1 GRIND	2,3,4 GRIND	5,6,7 GRIND
A-LENGTH X DIAMETER MM	1600X250	1600X250	1600X250	1000X250	1000X250	800X250	1000X250	1000X250	800X250
B-SPIRAL, % SLOPE	6%	8%	8%	8%	10%	10%	8%	8%	10%
C-CORRUGATIONS PER CM	5	5.5	6.5	7	7.5	8	10	10.5	10.5
D-PROFILE ANGLES	25/65	25/65	25/65	25/65	25/65	25/65	40/70	40/70	40/70
E-PERIPHERAL SPEED, M/SEC	6	6	6	6	6	6	6	6	6
F-ROLL DIFFERENTIAL, RATIO	1.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	1.5:1
G-PRESENTATION	D:D	S:S	S:S	S:S	D:D	D:D	D:D	D:D	D:D

APPENDIX 26

SAMPLE SCHEME OF 85% WHEAT EXTRACTION
MILL CAPACITY- 100 TONS PER 24 HOURS



	1 BREAK	2 BREAK	3 BREAK	4 BREAK	5 BREAK	1 GRIND	2,3,4,5 GRIND
A-LENGTH X DIAMETER, MM	1000X250	1000X250	1000X250	1000X250	1000X250	1000X250	1000X250
B-SPIRAL, % SLOPE	8%	8%	10%	10%	12%	10%	10%
C-CORRUGATIONS PER CM	5	5.5	6.5	7	9	9.5	10
D-PROFILE ANGLES	30°/65°	30°/65°	30°/65°	30°/65°	30°/65°	30°/65°	30°/65°
E-PERIPHERAL SPEED, M/SEC	6	6	6	6	6	6	6
F-ROLL DIFFERENTIAL, RATIO	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1	2.5:1
G-PRESENTATION	S:S	S:S	S:S	S:S	S:S	S:S	S:S

PI, P2, P3,- PURIFIER
FL - FLOUR